Ontario tax studies · 6

PENSIM

canada pension plan simulation model

staff paper
taxation & fiscal policy
ministry of treasury, economics & intergovernmental affairs

Preliminary

Ontario Tax Studies 6

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Canada Pension Plan Simulation Model

Staff Paper

Ministry of Treasury, Economics
and Intergovernmental Affairs

Taxation and Fiscal Policy Branch

Ontario

ONTARIO TAX STUDIES (Staff Papers)

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PREFACE

This study is a technical manual describing the operation of a quantitative computer model which simulates the Canada Pension Plan. The Ontario Government has developed this model, called PENSIM, in order to examine in depth the implications of alternative proposals for amending the Plan with respect to contributions, benefits and fund levels. The model has the capacity to test quickly a wide range of alternative amendments to the CPP, including the proposals advanced by the federal government in the 1970 white paper, Income Security for Canadians. In this way, it can contribute significantly to the achievement of a federal-provincial consensus on how the Canada Pension Plan should be restructured for the future.

The development of the PENSIM system and preparation of this study was undertaken in the Taxation and Fiscal Policy Branch of the Ministry of Treasury, Economics and Intergovernmental Affairs. We wish to acknowledge the cooperation of officials in the federal Department of Insurance, who made available the actuarial data necessary to construct the simulation model.

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September, 1972.

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I Introduction

The 1970 federal white paper, Income Security for Canadians, set out proposals for amending the Canada Pension Plan.[1] These proposals involve new contribution levels and revised benefit streams, hence would have a major impact both on taxpayers and pension recipients and on the future size of the CPP fund. It is of little value for the provinces to discuss these proposed CPP amendments or alternative amendments with the federal government without having a capacity to quantify and assess the implications of changes on the future operation of the Plan. Accordingly, the Ontario Government has developed a quantitative computer model, called PENSIM, to test the implications on contributions, benefits and fund levels of a broad range of alternative amendments to the CPP.

The purpose of this study is to set out in detail the design and operational dimensions of this pension simulator system. PENSIM uses a methodology which is similar to that employed by the federal Department of Insurance[2] but in addition provides great speed and flexibility in testing alternatives other than those advanced by the federal government. In Ontario's view it is necessary to go beyond the scope of testing only the federally proposed amendments. Rather, a comprehensive approach should be followed which reviews a wide range of alternatives. PENSIM provides a common vehicle which can be used by all governments for testing and assessing policy alternatives so that the final amendments to the CPP produce the best results in terms of benefits, contributions and funding in the years ahead.

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1. Hon. John Munro, Income Security for Canadians (Ottawa: Department of National Health and Welfare, 1970)

2. Department of Insurance, Canada Pension Plan: Actuarial Report as at December 31, 1969.

II METHODOLOGY

This technical manual serves as a guide for the use of PENSIM. It is not intended to be a complete description of the methodology of forecasting CPP contribution and benefit levels. Rather, its purpose is to provide sufficient information for the user to fully utilize the model to test policy variables.

PENSIM is comprised of ten interactive programs. Each program in the system inputs the results of its computations into one or more other programs. Due to the nature of the Canada Pension Plan, it is more efficient to segment the model into ten programs rather than using one large program. This method facilitates a saving of both time and expense.

As outlined in the PENSIM flow chart,[3] each program is categorized by the level in which it operates. Each level delineates the amount of interaction with other programs. A Level 1 program interacts with almost every other program on a higher level; a Level 2 program interacts with higher level programs but not with lower level programs.

If options are being tested that involve high level programs, it is not necessary to refer to lower level programs in the computation. For example, a change in the disability flat rate is computed by a Level 4 program. Interaction and consequently, cost, are minimized since only two programs must be run to effect the change: DISBN.7 and FUND.9. If an option is being tested that involves a low level program, a greater number of programs must be used. For example, if a new economic assumption is tested, then all programs would come into use to test the implications.

The advantage of this method of construction over a single program is that it is not necessary to run all the programs in order to test a change in certain variables. The segmented programming of PENSIM also gives faster turnaround. The entire PENSIM

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3. See page 5.

can be run in less than fifteen minutes and no program uses more than 24K of octal core.

The last program in the PENSIM model, CPPBN.10, is ancillary to the first nine programs. It does not affect in any way the output of the final program FUND.9. It is used to calculate the monthly pensions for each type of benefit to correspond with the options being tested.

The methodology incorporated in PENSIM is virtually identical to that developed by the Department of Insurance. Where possible, advantage was taken of the computer's speed and efficiency to improve the model and thus PENSIM works on a more disaggregated framework than the Department of Insurance method. Instead of computing estimates on a five-year basis, they are computed on an annual basis and in some cases, age groups are disaggregated. These changes do not substantially improve results but they do permit closer inspection of intermediate computations.

One improvement does make some change in the results. When calculating modified/modified average earnings, interpolations are made from a non-linear equation. PENSIM uses a mathematical technique to produce the equation and interpolate the values which results in more accurate computations than those employed by the Department of Insurance. However, these differences are barely visible in the final calculations.

The PENSIM model is written in standard Fortran IV and it is currently running on a PDP-10 computer. The programs are all teletype interactive and require responses by the user before they will operate. If PENSIM is to run on a non-interactive system or a computer other than the PDP-10, a number of changes would need to be made for compatibility. For example, the PDP-10 is an octal machine and requires no zeroing of arrays before execution. However, the IBM 360 or 370 is a hexidecimal machine and requires all the null arrays to be zeroed before execution.

The remainder of this technical manual describes the operation of PENSIM. Each program is a self-contained chapter and listings of the programs are found in the Appendix.

PENSIM FLOW CHART

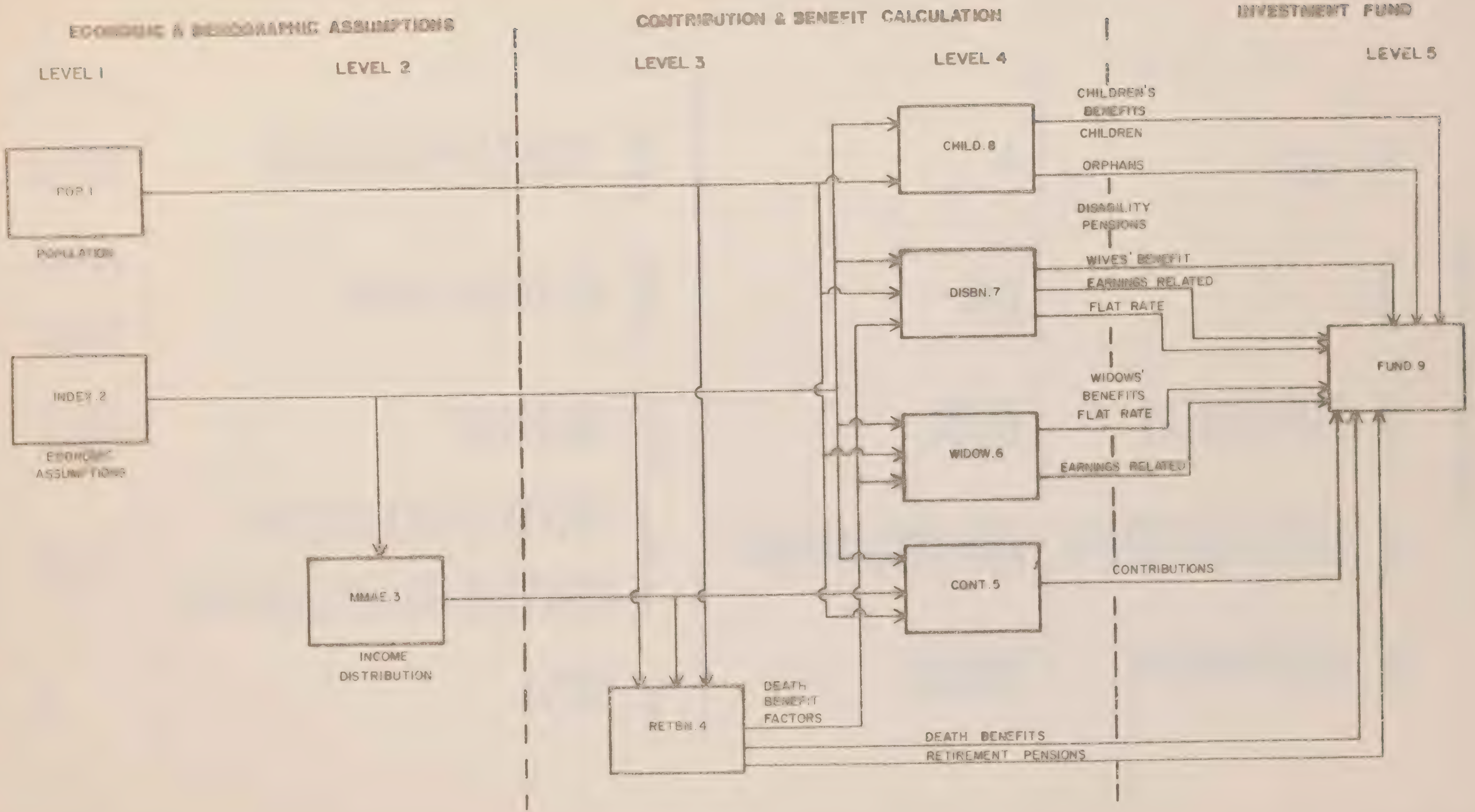


CHART OF INPUT AND OUTPUT FILES

	POP.1	INDEX.2	MMAE.3	RETBN.4	CONT.5
INPUT	PRJM		RSCUR	RSCUR	RSCUR
	PRJM[1]		MICUR	MICUR	MICUR
	PRJF		RSPRO	RSPRO	RSPRO
	PRJF[1]		MIPRO	MIPRO	MIPRO
			TXFPB	TXFPB	TXFPB
			RSIND	RSPNX	MMRSC
			MIIND	MIPNX	MMMIC
			TFIND	TFPNX	MMRSP
			POINT	MMRSC	MMMIP
			AVE67	MMMIC	MMTFP
			ADJFC	MMRSP	ONE
				MMMIP	OPSHN
				MMTFP	
				ONE	
				SURVM	
OUTPUT	ONE	TXFPB	MMRSC	RTRSC	CONT
		TFIND	MMMIC	RTMIC	RSCCN
		TFPNX	MMRSP	RTRSP	MICCN
			MMMIP	RTMIP	RSPCN
			MMTFP	RTTFP	MIPCN
				DBRSC	TFPCN
				DBMIC	
				DBRSP	
				DBMIP	
				DBTFP	
				DHRSC	
				DHMIC	
				DHRSP	
				DHMIP	
				DHTFP	

	[illegible]OW.6	[illegible].7		CHILD.8	FUND.9		CPPBN.10
INPUT	RSCUR	RSCUR		RSCUR	RSCUR	RSCWD	RSCUR
	MICUR	MICUR		MICUR	MICUR	MICWD	RSPRO
	RSPRO	RSPRO		RSPRO	RSPRO	RSPWD	MICUR
	MIPRO	MIPRO		MIPRO	MIPRO	MIPWD	MIPRO
	TXFPB	TXFPB		TXFPB	TXFPB	TFPWD	TXFPB
	RSPNX	RSPNX		RSPNX	RTRSC	DSRSC	
	MIPNX	MIPNX		MIPNX	RTMIC	DSMIC	
	TFPNX	TFPNX		TFPNX	RTRSP	DSRSP	
	ONE	ONE		ONE	RTMIP	DSMIP	
	SURVM	DHRSC			RTTFP	DSTFP	
	SURVP	DHMIC			DBRSC	RSCWF	
	REMAR	DHRSP			DBMIC	MICWF	
	PWEWB	DHMIP			DBRSP	RSPWF	
	DHRSC	DHTFP			DBMIP	MIPWF	
	DHMIC				DBTFP	TFPWF	
	DHRSP				RSCCN	RSCCH	
	DHMIP				MICCN	MICCH	
	DHTFP				RSPCN	RSPCH	
					MIPCN	MIPCH	
					TFPCN	TFPCH	
						RSINT	
						MIINT	
						TFINT	
OUTPUT	RSCWD	DSRSC	RSCWF	RSCCH	RSCFD		
	MICWD	DSMIC	MICWF	MICCH	MICFD		
	RSPWD	DSRSP	RSPWF	RSPCH	RSPFD		
	MIPWD	DSMIP	MIPWF	MIPCH	MIPFD		
	TFPWD	DSTFP	TFPWF	TFPCH	TFPFD		BENFT

III POP.1

A. INTRODUCTION

Program POP.1 is designed to interpolate population statistics between five-year intervals using the Lagrangean polynomial technique. The Department of Insurance provided population data for the years 1966, 1970, 1975, 1980, ..., 2025. This program is specifically designed to interpolate population figures between these intervals.

B. VECTORS AND MATRICES

W - contains the interpolating weights calculated in the program.

KSUB - is a vector which supplies the appropriate subscript for the vector NO.

FAC - contains the calculated denominator that is used to compute the weights.

XNUM - contains the calculated numerator that is used to compute the weights.

NO - supplies the interpolation reference points for the calculation of the values that are stored in FAC and XNUM.

POPM - input vector of male population data.

POPF - input vector of female population data.

POP - interpolated population output data.

C. INPUT FILES AND DATA STATEMENTS

Input files PRJM1 and PRJF1 contain the population statistics for the nineteen age classes for 1966 for males and females respectively.

PRJM and PRJF contain the remaining population statistics for each five-year interval from 1970 through to 2025 for each of the nineteen age classes for males and females.

The nineteen age groups are:

0 - 4	50 - 54
5 - 9	55 - 59
10 - 14	60 - 64
15 - 19	65 - 69
20 - 24	70 - 74
25 - 29	75 - 79
30 - 34	80 - 84
35 - 39	85 - 89
40 - 44	90 +
45 - 49	

D. METHODOLOGY

The weights used in calculating the interpolated values are derived by the Lagrangean polynomial method. The w_j weights are computed by

$$w_j(t) = \frac{\Pi\ (t - t_i)}{\Pi\ (t_j - t_i)} \quad i \neq j;\ j = 1, 2, \ldots, n = 1$$

or in longer form

$$w_1\ (t) = \frac{(t - t_2)(t - t_3)(t - t_4)\ \ldots\ (t - t_{n+1})}{(t_1 - t_2)(t_1 - t_3)(t_1 - t_4)\ \ldots\ (t_1 - t_{n+1})}$$

$$w_2\ (t) = \frac{(t - t_1)(t - t_3)(t - t_4)\ \ldots\ (t - t_{n+1})}{(t_2 - t_1)(t_2 - t_3)(t_2 - t_4)\ \ldots\ (t_2 - t_{n+1})}$$

$$\vdots \qquad\qquad \vdots$$

$$w_{n+1}(t) = \frac{(t - t_1)(t - t_2)(t - t_3)\ \ldots\ (t - t_n)}{(t_{n+1} - t_1)(t_{n+1} - t_2)(t_{n+1} - t_3)\ \ldots\ (t_{n+1} - t_n)}$$

In the program four weights are calculated over a fifteen-year interval. There are four of these intervals in the sixty-year time horizon of the data. The second, third and fourth intervals all have the same weights. The weights in the first interval are slightly different due to the fact that this interval contains fourteen years rather than fifteen. The program has been written to handle this problem.

The calculation of the first set of weights is set out below.

$$w_1 = \frac{(t - 5)(t - 10)(t - 15)}{(1 - 5)(1 - 10)(1 - 15)}$$

$$w_2 = \frac{(t - 1)(t - 10)(t - 15)}{(5 - 1)(5 - 10)(5 - 15)}$$

$$w_3 = \frac{(t - 1)(t - 5)(t - 15)}{(10 - 1)(10 - 5)(10 - 15)}$$

$$w_4 = \frac{(t - 1)(t - 5)(t - 10)}{(15 - 1)(15 - 5)(15 - 10)}$$

The expression to calculate the population statistic is

$$P_t = \sum_{j=1}^{4} W_j X_q \qquad j = 1, 2, 3, 4$$

$$q = \begin{cases} 1, & 5, & 10, & 15 \\ 15, & 20, & 25, & 30 \\ 30, & 35, & 40, & 45 \\ 45, & 50, & 55, & 60 \end{cases}$$

where the X_q refer to

X_1	1966
X_5	1970
X_{10}	1975
X_{15}	1980
.	.
.	.
.	.
X_{60}	2025

An interpolated value in year t in the first interval would be calculated by

$$P_t = W_1 X_1 + W_2 X_5 + W_3 X_{10} + W_4 X_{15}$$

The vector NO(24) contains the reference points for the interpolation. Thus, the first six numbers in this vector are 5, 10, 15, 1, 10, 15 which correspond with the values to calculate W_1 and W_2. For the first fifteen-year interval there are 12 points, 4 groups of 3 each, because the program uses a four point interpolation and each weight uses three reference years. The second block of twelve numbers in NO(24) refers to the second fifteen-year

interval. Since the weights are identical for all intervals other than the first, it is not necessary to calculate them.

The vector KSUB(8) contains the appropriate subscripts to reference NO(24) in order to make the interpolation work.

E. OUTPUT FILES

POP.1 produces one output file named ONE. This file contains all the population statistics for Canada less Quebec for the years 1966 to 2025. A complete description can be found in chapter XIII.

F. NOTES

Problems will be encountered in the use of this program if the user is attempting to interpolate population statistics different from those that exist in files PRJM1, PRJF1, PRJM, and PRJF. Provincial population statistics can be used but care must be taken.

As the program is written, the X_q's must correspond to the years as outlined in the methodology. In addition, the population statistics must correspond to the fifteen-year intervals. For example, assume data exist for the years 1966, 1970, 1975, 1980, 1985, and 1990. Any interpolated values in the first interval 1966-1980 will be correct. However, if the user interpolates a value for 1986, the result will be incorrect. The problem occurs because there is not enough data to supply all the reference points for the second interval. An interpolated value for 1986 not only depends on values for 1980, 1985 and 1990 but also 1995. If there is no value for 1995, then results will be nonsensical.

It is possible to interpolate correct values without having data to 2025 but it is necessary to have complete intervals.

IV INDEX.2

A. INTRODUCTION

Program INDEX.2 projects the pension index and YMPE levels used in the PENSIM model. The calculation of the pension index is based upon section 20 of the Canada Pension Plan and the program will generate values up to the year 2025.

Similarly, the program calculates the earnings index for 1975-2025 under the provisions of the Plan and uses this index to produce the YMPE's for the time horizon based upon the assumption being tested.

The user initializes the program from the terminal and inputs the variables he wants to change (see section E).

The actual data for 1966-1969 is used as the basis for future projections and this information is fixed within the program.

B. VECTORS AND MATRICES

AVINC - this vector lists the annual increase in average earnings used in the calculation of the average earnings levels each year and thus the earnings index for each year 1975-2025.

AVERN - this vector contains the projected average earnings levels for each year 1966-2025 where 1966 = 1.0 and is escalated by the appropriate AVINC value.

CPINC - this vector lists the annual increase in the consumer price index used in the calculation of the pension index.

CPI - this vector contains the projected consumer price index for each year 1966-2025 where 1961 = 100.0 and is subsequently escalated by the appropriate CPINC value.

ERIND - this vector contains the earnings indices for each year 1975-2025 based upon the eight-year moving average lagged two years as defined in section 21 of the Canada Pension Plan.

ERBAS - this number is the sum of the earnings levels for 1966-1973 used as the base for calculating the earnings index.

PNIND - this vector lists the pension indices for each year 1967-2025 as calculated in the program where 1967 = 100.0 for PENSIM purposes. The values are output as TFPNX.DAT.

YMPE - this vector stores the YMPE values for each year 1966-2025 which are input up to 1975 . Beyond that year they are the 1975 YMPE multiplied by the earnings index and rounded down to the nearest $100 as required by the Plan. The values are output as TXFPB.DAT.

C. INPUT FILES AND DATA STATEMENTS

No input files are used but the actual values for 1966-1969 of AVINC, CPI, PNIND and YMPE are input in data statements.

D. METHODOLOGY

1. Pension Index

The Act sets out the method for calculating the pension index in section 20. The values for 1967-1969 are input directly as data. Briefly, the pension index is the average of the CPI levels for the twelve months ending on June 30 of the previous year subject to a 2 per cent ceiling on any annual increase. Thus, it becomes necessary to project CPI levels for each year and find the average CPI level centred over January 1 of the previous year. This is done by calculating the CPI level for each year based upon an annual increase in CPI which the user inputs for each year until 1975. The 1975 increase is used for all subsequent years. To find the average CPI centred over January 1, the average of the CPI levels for the two previous years is calculated.

Because of the ceiling on the pension index of 2 per cent with a floor of 1 per cent, it is necessary to do an annual comparison of the previous year's pension index escalated by the ceiling and the CPI level for the 12-month period ending the previous June 30. To maintain the PENSIM flexibility, the user may specify any ceiling on the pension index e.g. a 3 per cent ceiling.

For calculation purposes, the pension indices were then adjusted so that the 1967 pension index = 100.0.

2. Earnings Index and YMPE

The statute explains how the YMPE levels are to be calculated in each year. The value in 1966 and 1967 was set at $5,000 and escalated until 1975 by the pension index and thereafter by the earnings index. The YMPE levels for 1966-1972 are known and thus input as data. The user will then specify the YMPE levels for 1973-1975 and similarly he will input the annual increase in average earnings for 1970-1975 where the 1975 value is used in all subsequent years.

The YMPE calculation for all years beyond 1975 is based on the 1975 YMPE level multiplied by the earnings index and rounded down to the nearest $100. Thus, the earnings index must be calculated for each year 1975-2025 where the 1975 value = 1.0.

The Plan defines the earnings index as the average of the annual average earnings levels for the eight years ending two years previous, divided by the average of annual average earnings levels for 1966-1973. Thus, it is necessary to calculate the level of annual average earnings for each year to 2025 where 1966 = 1.0.

The basis for the earnings index is the average of these levels for 1966-1973 and to simplify the calculation, these are merely summed and divided into the sum of the earnings levels for the eight years ending two years previous as required by law. This ratio is the earnings index for each year 1975-2025.

3. Annual Increase in Average Earnings Index

This index may be used in program MMAE.3 to escalate the 1967 level of average earnings taken from the CPP computer output of contributor data.

E. POLICY VARIABLE INPUT

As described above the user specifies the YMPE levels in 1973-75 at the time he is running the program. The program asks the question and the user merely types in his response for each year.

Similarly, the annual increase in average earnings and in consumer price index is input by the user at the keyboard for each year 1970-1975. He may choose to use the economic assumptions on page 23 of the Actuarial Report or he may select his own. The values input for 1975 are taken for each subsequent year.

Finally, the user must specify the ceiling he wishes to use on annual increases in the pension index.

A sample answer to each question is provided at the time the question is posed to assist the user.

F. TELETYPE QUESTIONS

The user must respond to the following questions for the program to continue execution.

1) SPECIFY YMPE IN nnnn:

   Where nnnn is 1973, 1974, and 1975. The user should respond with the YMPE's that will be used in a) the current plan; b) the proposed plan; or c) a new plan to be tested for the years indicated.

2) SPECIFY GROWTH IN AVERAGE EARNINGS IN nnnn:

   Where nnnn is 1970, 1971, 1972, 1973, 1974 and 1975. Respond with the growth rates outlined on page 23 of the 1969 Actuarial Report or with new ones.

3) SPECIFY GROWTH IN CPI IN nnnn:

Where nnnn is 1970, 1971, 1972, 1973, 1974, and 1975. Respond with the consumer price indices outlined on page 23 of the 1969 Actuarial Report or with new ones.

4) SPECIFY CEILING ON PENSION INDEX:

Respond with the desired ceiling for the pension index.

G. OUTPUT FILES

The pension index projections generated by this program are stored in output file TFPNX.DAT. The YMPE projections are stored in output file TXFPB.DAT and the index of increase in average earnings is stored in output file TFIND.DAT. These files may then be used in running the PENSIM model.

H. NOTES

Program Index.2 produces a series of index projections as specified by the user. However, PENSIM will normally default to one of the four schemes tested in the Actuarial Report i.e. moderate inflation/reasonable stability and current plan/proposed plan. The user would normally specify one of these plans in which case the output files from INDEX.2 will not be used. This program was designed, however, for the user who wishes to choose a further set of policy alternatives and specifically where the objects of examination are the economic assumptions and hence the indices and YMPE levels.

V MMAE.3

A. INTRODUCTION

The program MMAE.3 calculates modified modified average earnings for different age groups of CPP contributors through time. The results are stored in a data file for use in a number of other programs in the PENSIM model.

The term modified modified average earnings originates from the double modification applied to average earnings for the Canadian population less Quebec.

The first modification results from calculating average earnings using only those earnings which are equal to or less than the year's maximum pensionable earnings (YMPE). Any earnings in excess of this amount are ignored. Thus modifed average earnings are less than the real average earnings for the population. This calculation is one of the more complex in the PENSIM model and is discussed in more detail later in this document.

The second modification takes place by deflating all modified average earnings with an index constructed by dividing the 1967 base year YMPE by the YMPE in each year. Modified modified average earnings then have a 1967 constant dollar value in terms of productivity changes and inflation. This allows the programmer to test various economic assumptions to blow up modified average earnings through time.

B. VECTORS AND MATRICES

YMPE - contains the YMPE's of the option being tested for the 60-year time horizon of the program.

AVERN - contains calculated average earnings stored in 11 age groups, through 60 years for both sexes.

INDEX - contains the reasonable stability or moderate inflation indices for growth in average wages depending on the option being tested.

YBE - contains the results of the calculation of the Year's Basic Exemption for 60 years, the method depending on the assumption being tested.

VALU - is a utility array which is overwritten several times during the course of operation of the program. Its final output is the modified modified average earnings (MMAE) which is stored in the same manner as the AVERN array.

The eleven age groups are:

15-19	45-49
20-24	50-54
25-29	55-59
30-34	60-64
35-39	65-69
40-44	

These groups are the only ones necessary since contributions to the CPP cannot begin before age 18 and cease after age 69. The sixty years are the years from 1966-2025. The order of sexes is males first, females second.

ADJ - is a vector of adjustment factors which is explained below.

C. INPUT FILES AND DATA STATEMENTS

There are five data files read in by MMAE.3. The first reads the annual YMPE's produced by the program INDEX.2. The input file read in keys off the word typed in at the beginning of the program. A listing of the files can be found in chapter XIII. The second file read in, ADJ, contains twenty-two adjustment factors that are used to approximate the income distribution of the other age groups interpolated from the 40-44 age group.

The initial contents of the AVERN matrix are read in from the data file AVE67. This file contains two groups of eleven items (male and female); one item for each of the eleven age classifications. The data consists of the 1967 total earnings for each age group and sex divided by the total number of contributors in each age group and sex.

The values read into the vector INDEX are the growth indices which are used to escalate average earnings through time. They are based on the growth rates found on page 23 of the 1969 Actuarial Report. The index which is used is keyed off by the teletype response entered by the programmer. These files are listed in chapter XIII.

The final data file is read in during the execution of subroutine SPLINE. The file read in is POINT. The data in this file is used to set up the interpolating function for the spline operation. The first value, J, denotes whether the first (J = 1) or second (J = 2) derivatives of the end points are being supplied. The two values for D are the first or second derivatives of the end points. The next thirty-one values are the X's and the final thirty-one are the Y's to give the thirty-one ordered pairs which describe the interpolating function. There are four sets of points as described above, each of which has two sets of values interpolated from it to produce eight sets of interpolated points.

D. METHODOLOGY

The basic operation of the program consists first of calculating the average earnings matrix. This is a simple operation involving nothing more than escalating age-grouped 1967 average Canadian (except Quebec) earnings by an appropriate index which is found on page 23 of the 1969 Actuarial Report. If the user wishes to use another index it should be entered in the data file TFIND, created by program INDEX.2.

The matrix AVERN is then divided year-wise into the vector YMPE for upper-limit values, and then into the vector YBE for lower-limit values, by age and sex. The results are stored in the matrix VALU. This gives the YMPE and the YBE as a percentage of average earnings by age group and sex.

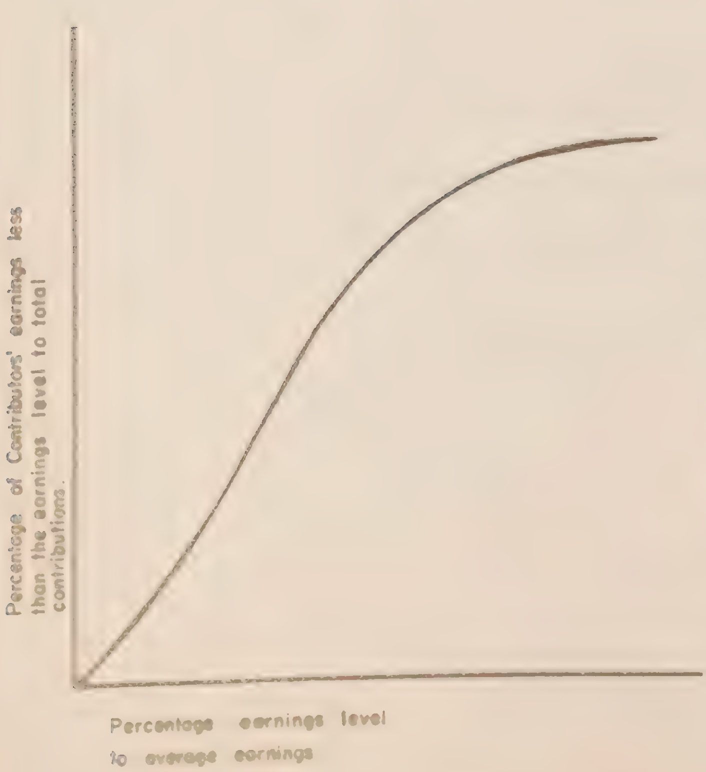
At this point the Department of Insurance derived four graphs to calculate modified average earnings. All the graphs were computed on the basis of the income distribution of the 40-44 age group. There are two graphs for males and two for females.

The first graph in each sex group shows the functional relationship between the dollar value of contributors' earnings which are less than the YMPE, expressed as a percentage of total contributions, and the earnings levels of the contributors' age group expressed as a percentage of average earnings.

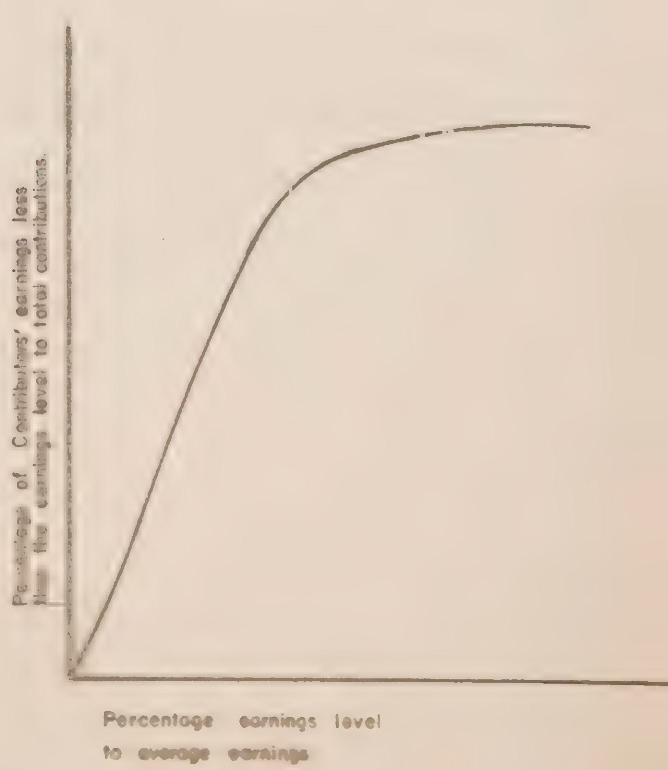
The second graph shows the relationship between contributors' earnings groups to total earnings, and the earnings levels of the contributors' age group expressed as a percentage of average earnings. The shapes of these graphs are depicted below.

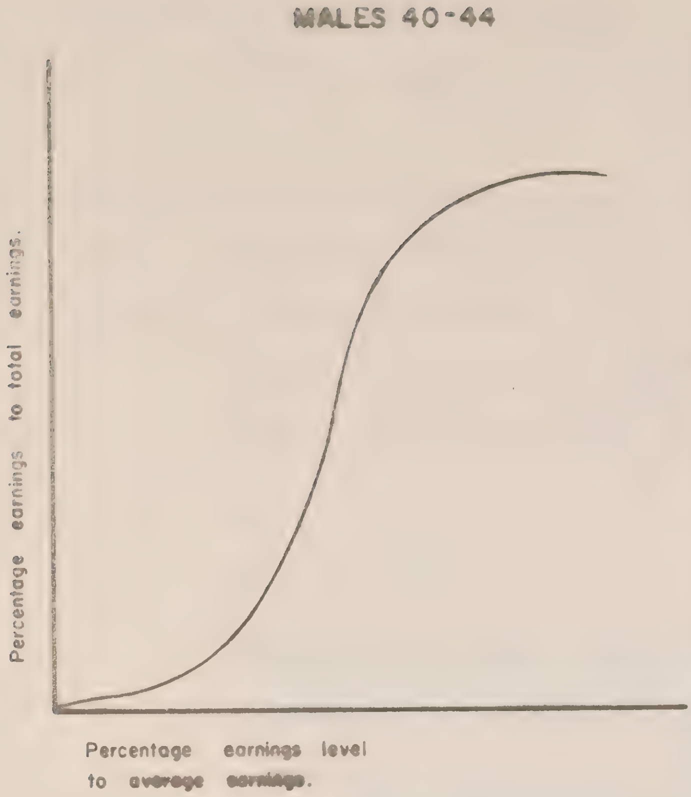
The percentages which are stored in VALU are then interpolated in turn from these graphs; both the upper and lower-limit values are interpolated for each graph which produces eight sets of interpolated values. The percentages stored in VALU can be considered as X values from which we are interpolating Y values on the graphs.

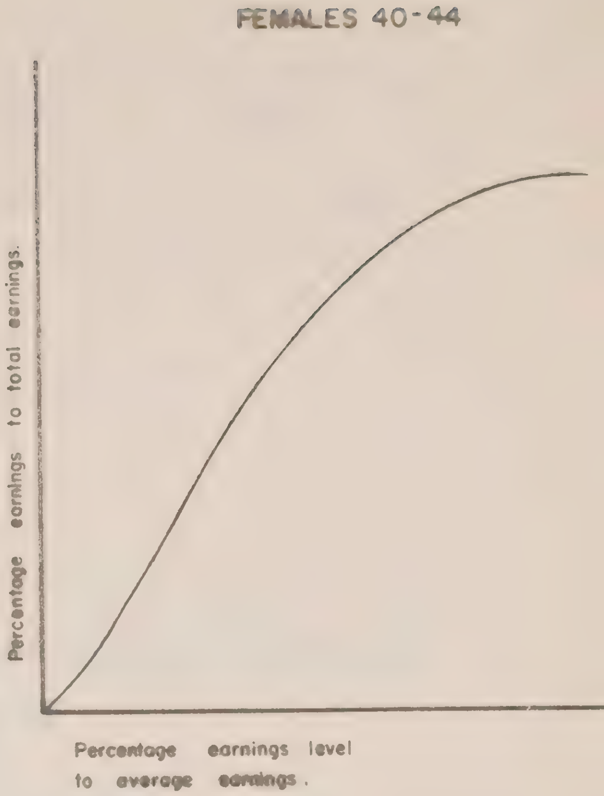
MALES 40-44



FEMALES 40-44







To transform the interpolated values into income distributions for the other age groups a set of adjustment factors was calculated by the Department of Insurance. These factors are found in the vector ADJ. There are 11 age groups for each sex for a total of 22 factors. This method was utilized instead of constructing graphs for all the age groups because of the rather gross nature involved in setting up the graphs and using a hand interpolation method to draw the functions. It was felt that an adjusted interpolation was more accurate than the ocular method.

The interpolating procedure used in PENSIM is the cubic spline method. This calculation is found in subroutine SPLINE of the program MMAE.3. The variables used in the explanation of the method are the same as those found in the program.

The method is as follows:

in the i^{th} interval (X_i, X_{i+1}) define

$$a_i = X_{i+1} - X_i$$

$$Y_i = y_{i+1} - y_i$$

$$H_i = \frac{a_i}{a_{i+1}}$$

The general cubic then has the form:

$$y(x) = y_i + A_i \frac{(x - x_i)}{a_i} + B_i \frac{(x - x_i)^2}{(a_i)2} + C_i \frac{(x - x_i)^3}{(a_i)3} \qquad (1)$$

Under the conditions that the values of the y, y', y'' be the same at X_{i+1} for the intervals (x_i, x_{i+1}) and (X_{i+1}, X_{i+2}) we obtain the following equations:

Replace x with x_{i+1} in equation (1), then

$$y(x_{i+1}) = y_i + A_i + B_i + C_i$$

or

$$Y_i = A_i + B_i + C_i \qquad (2)$$

where the A_i, B_i and C_i are the interpolating coefficients.

Differentiating equation (1) we get

$$y'(x) = \frac{A_i}{a_i} + \frac{2B_i}{a_i} \cdot \frac{(x - x_i)}{a_i} + \frac{3C_i}{a_i} \cdot \frac{(x - x_i)^2}{(a_i)2} \qquad (3.1)$$

Then for the interval (x_{i+1}, x_{i+2})

$$y'(x_{i+1}) = \frac{A_{i+1}}{a_{i+1}} \qquad (3.2)$$

Equating (3.1) and (3.2) and eliminating A_i with equation (2),

$$-Y_i = B_i + 2C_i - H_i A_{i+1} \qquad (3)$$

Differentiating equation (1) again gives:

$$y''(x) = \frac{2B_i}{a_i 2} + \frac{6C_i}{a_i 2} \cdot \frac{(x - x_i)}{a_i}$$

Similarly, we evaluate $y''(x)$ for the two intervals (x_i, x_{i+1}) and (x_{i+1}, x_{i+2}). Equating the two we get

$$Y_i = C_i + H_i A_{i+1} - H_i^2 B_{i+1} \qquad (4)$$

where $i = 1, 2, \ldots, n - 2$

If the first derivatives are specified at x_1 and x_n, the following set of equations is adjoined to equations (2), (3) and (4):

$$A_1 = a_1 y' \qquad (5.1)$$

$$B_n + 2C_{n-1} = a_{n-1} y'_n - y_{n-1} \qquad (6.1)$$

If the second derivative is specified the following set is used instead:

$$B_i = \frac{1}{2} a^2 y'' \tag{5.2}$$

$$2B_{n-1} + 6C_{n-1} = (a_{n-1})^2 y_n'' \tag{6.2}$$

To ensure that the point (x_n, y_n) lies on the $(n - 1)$ of the cubic we use:

$$A_{n-1} + B_{n-1} + C_{n-1} = Y_{n-1} \tag{7}$$

Finally, the set of equations (2), (3), (4), (5.1), (6.1) or (5.2), (6.2) (depending whether the 1st or 2nd derivatives are specified respectively) and (7) form a tridiagonal system of $3n - 3$ equations.

To solve the tridiagonal system for the $3n - 3$ unknown coefficients

A_i, B_i, C_i $\quad i = 1, 2, \ldots, n - 1$

a step-by-step procedure is used.

During the operation of the program the user is unaware of the interpolation procedure since it is completely automatic. It is probably best to regard it as a black box.

A word of caution is interjected here regarding the use of the input file POINT in the SPLINE subroutine. It may be necessary to constrain the end points to the derivatives that have been specified. This can be accomplished by adding sets of ordered pairs to either, or both end points. The fact that the spline interpolation method requires the cubic between points X_{i-1} and X_i agree with the cubic between points X_i and X_{i-1} at the point X_i in their first and second derivatives makes this constraint necessary. One method to ensure correct specification is to have the interpolating function plotted on a CALCOMP Incremental Plotter or some other similar peripheral device to see the exact shapes of the function at its end points.

Once the interpolation is completed the 5280 values are stored in the matrix VALU(11 x 60 x 8). There are four sets of interpolated values for males and four for females. The four sets are composed of:

A) proportion of contributors' earnings less than the YMPE

B) proportion of contributors' earnings less than the YBE

C) proportion of earnings less than the YMPE

D) proportion of earnings less than the YBE.

Let the average wage per age group in the year under consideration be E and the appropriate year's YMPE be F. The final calculation of modified average earnings is given by the expression

$$\frac{E(C - D) + F\,(1 - A)}{1 - B}$$

In the program this calculation takes place in one line and simultaneously it is adjusted to the proper income group and deflated to 1967 constant dollars. The deflation is computed by dividing the 1967 YMPE ($5,000) by the YMPE of the year in question.

E. POLICY VARIABLE INPUT

During the execution of the program the user is asked a number of questions. The user must supply an answer before execution will continue. The first question relates to the type of plan that is to be tested. There are five possibilities each represented by a suitable acronym.

RSCUR	- reasonable stability, current plan
MICUR	- moderate inflation, current plan
RSPRO	- reasonable stability, proposed plan
MIPRO	- moderate inflation, proposed plan
TXFPB	- user-specified option.

These are the key words which govern the set of YMPE's that are read into the program. They are based on the four sets of projections as developed by the Department of Insurance, Ottawa. The fifth possibility is TXFPB which allows the user to specify any set of YMPE's that he wishes. TXFPB is an output file produced by program INDEX.2.

In addition, these codes govern the index that is read in to escalate annual average earnings (AVE67).

RSCUR RSPRO	-	RSIND - reasonable stability index
MICUR MIPRO	-	MIIND - moderate inflation index
TXFPB	-	TFIND - user-generated index

If the user has specified the current or proposed plan the proper calculation of the YBE is done automatically. If the TXFPB option is specified, the user will be asked whether he desires the current or proposed plan method of calculating the YBE.

F. OUTPUT FILES

MMAE.3 produces one output file of modified modified average earnings per run. The output file produced has the 'MM' prefix plus the first three letters of the original code word for type of plan typed in. For example, a MIPRO run will produce an output file named MMMIP. At the end of execution the name of the output file generated will appear on the teletype. The output file stores the modified modified average earnings matrix by year, by age, by sex. (60, 11, 2)

G. TELETYPE QUESTIONS

There is one question posed by the teletype that the user must respond to. An additional question is asked if the user specifies the TXFPB option.

1) TYPE IN PLAN TO BE TESTED:

Respond with one of the five-letter code words outlined in section (E). If the user misspells one of these words, the terminal will reply for example, RXPRO?, TRY AGAIN.

2) YBE - CURRENT/PROPOSED?

Respond with either CURRENT or PROPOSED. This question is asked if the user specifies the TXFPB option in question 1 above. The computer must know which method of calculating the YBE the user desires.

H. NOTES

If the user wishes to use a different YBE it must be changed in the program.

To produce an income distribution for a provincial run, a new POINT file must be created. The data to create this file is available from the CPP Research and Planning Division. In addition, the files AVE67 and ADJFC must be converted to provincial data bases.

VI RETBN.4

A. INTRODUCTION

RETBN.4 is the fourth program in the PENSIM series designed to provide benefit costs in the calculation of the CPP fund projections. This program specifically calculates the costs of retirement pensions and the costs of the lump sum death benefit payable to the contributor's estate on his death. As well, RETBN.4 generates the death benefit factors that are required in WIDOW.6 and DISBN.7 for the projection of the earnings-related benefit costs.

The method used in RETBN.4 is adapted from the valuation of the federal Department of Insurance for the Canada Pension Plan as at December 31st, 1969. RETBN.4 uses all the assumptions found in the Actuarial Report and was designed specifically to test the four schemes i.e. moderate inflation, reasonable stability, current and proposed plans found in the Report. These in turn are based on the federal government's proposals to amend the Canada Pension Plan as described in the White Paper on Income Security, 1970.

In addition to estimating costs based on the four sets of assumptions above, RETBN.4 can be used to assess a variety of policy alternatives for retirement pensions, and indirectly, all earnings-related pensions. In concert with similar changes in the other PENSIM programs, fund projections to the year 2025 can be established quickly.

Policy variables handled by RETBN.4 include the retirement pension rate, the drop-out rate of lowest annual earnings ratios, the retirement age, the earnings test, federal or provincial data, the pension index formula, the earnings index formula, and the cost-of-living escalators.

5. VECTORS AND MATRICES

PART - This matrix contains the labour force participation rates by sex, year and plan and is input through a data statement.

MMAE - This matrix contains the modified modified average earnings as calculated in program MMAE.3 by age group, sex and year. The data is input from the disk and is keyed by a switch at the start of execution which asks which plan is being tested.

PMMAE - This matrix is the participating modified modified average earnings and is obtained by multiplying each element in MMAE by the appropriate participation rate in PART.

FILE - This vector contains the input-output file names where five options are available for each of YMPE, MMAE, death benefit factors, death benefit costs and retirement pension costs. This option is keyed from the switch at the start of execution.

SUM - This matrix is used to sum the PMMAE's for any age group over the contribution years of the age group and sex.

DROP - This vector sums the earnings dropped out for males because of the drop-out provisions in the Act. The drop-out rate is a policy variable in this program and is input from the TTY at the start of execution. The drop-out calculation occurs in subroutine MIN.

YRSPRT - This vector contains the years of participation for each age group depending on the year of death or retirement (LASTYR) and the first year of participation in the CPP (FRSTYR).

EXPOS - This vector contains the years of participation that are dropped out from the calculation of total pensionable earnings in subroutine MIN. Each element is obtained by multiplying YRSPRT by the drop-out rate input from the TTY.

NR - This counter is used in a do-loop where each iteration is death at a different age.

TPNER - This matrix is total pensionable earnings by age group and sex and is the difference between SUM and DROP.

TEM1 - This vector is a temporary one in which is stored the product of YRSPRT* non-dropped-out percentage *(1/retirement rate) (input from TTY at start of execution). Because of the maturing aspects of the Plan, if the years of participation are less than 10, there is no drop-out provision and TEM1 is merely YRSPRT * 1/retirement rate.

TEM - This matrix is a special case used only for retirement at age 65 and is used temporarily to find an average TEM1 for that iteration only.

DSDRP - This matrix is used to increase the factor by a disability drop-out factor. This data is input in a data statement and is used in the program based on the NR iteration.

RTFAC - This matrix is for temporary storage of the retirement/ death benefit factors and the column of factors is then converted to row form in matrix FACTOR.

FACTOR - This matrix contains the death benefit factors for the calculation of death benefit costs. After this calculation, the last six rows are overwritten by minor changes to compute the retirement benefit costs.

ESC1 - This vector contains the first escalation factors which are used to escalate factors for age groups 65+. The calculations of ESC1 elements are based on Department of Insurance methods and are made in the program.

ESC2 - This vector contains the second escalation factors which are used in the calculation of death benefit costs.

SURVRT - This matrix contains the survival rates by age group, sex and year and is input from disk file SURVM.DAT.

POP - This matrix contains the population by age group, sex and year and is input from disk file ONE.DAT.

NMDTH - This matrix contains the number of deaths i.e. (1 - survival rate)* population* the appropriate death benefit factor for the calculation of the death benefit costs.

DTHCS1 - This matrix is the summation of death benefit costs for all age groups up to age 65 by sex and is then overwritten by multiplying the first nine age groups by the second escalation factor and later overwritten by the total death benefit costs.

DTHCS2 - This matrix is the summation of death benefit costs for all age groups from age 65+ by sex and is then overwritten by multiplying the last six age groups by the pension index.

PNIND - This vector contains the pension index for each year and is input from disk depending on the plan being tested.

RTCST - This matrix contains retirement pension costs by sex and year and can be output in table form or in data form for use in FUND.9.

DREDC - This vector contains factors that reduce the death benefit costs because of the ceiling of six months imputed retirement pension or 10 per cent of the year's YMPE.

C. INPUT FILES AND DATA STATEMENTS

The most important source of data required in program RETBN.4 is the appropriate matrix of modified modified average earnings produced by program MMAE.3.

Because the retirement and death benefit factors are totally dependent on earnings levels, this file must be read into matrix MMAE and used as the basis of calculation.

Similarly, it is necessary to read in the population figures as generated by POP.1 in file ONE. This source of data is read into vector POP.

The appropriate levels of YMPE and the pension index are read in from the disk and the selection of the proper file is keyed from the terminal by the user in his choice of plan being tested.

For the plan under consideration, the user will select one of the code words listed in chapter V.

Two other files which input from the disk are sources of data on survival rates and reduction factors. The former is SURVRT used in the calculation of death benefit costs and the latter DREDC is used to account for the ceiling on the death benefit of 10 per cent of the year's YMPE.

Also used as data are the labour force participation rates of vector PART; disability drop-out rates (DSDRP) and a series of numbers representing the ages of contributors in 1966 (FRSTYR) and the ages of contributors in the year of their death (LASTYR), necessary to calculate the death benefit rate.

D. METHODOLOGY

For this description, program RETBN.4 can be split into two distinct parts. The first is the calculation of the retirement benefit factors and death benefit factors, and the second part is the calculation of the retirement benefit costs and death benefit costs based on the earlier calculations.

Because the factors generated in the first section of this program are earnings-related, they are also used in WIDOW.6 and DISBN.7 to calculate the earnings-related portion of those supplementary benefits.

The program is initialized by the user from the teletype when he selects the policy variables he wishes to use. By typing in any of the plans mentioned in chapter V, the user invokes a series of switches which are used to call in the other data e.g. modified modified average earnings, YMPE levels, pension index values, etc.

The calculation of the benefit factor for any age group involves summing the modified modified average earnings (MMAE) amounts for each year of participation. Thus for someone who participates in the CPP from age 18 to age 65 this sum will be the total of 47 earnings amounts.

To ensure that the projections reflect only those for participants in the Canada Pension Plan, the MMAE's are multiplied by the appropriate labour force participation rate depending on the year, sex, and policy options being assessed. The result of this operation produces a matrix of "participating" MMAE's (PMMAE) for each year, sex, and age group.

To facilitate the summation of these PMMAE's for each age group, it is first necessary to do a transformation of this matrix. In so doing, the method departs slightly from that of the Department of Insurance, though the results are the same. The federal method involves a diagonal step-wise addition of these PMMAE's for every five-year interval and for each five-year age group. However, because PENSIM generates annual data, it is easier and more accurate to transform the matrix from a diagonal series through time for each age group to a matrix of rows, each of which contains up to forty-seven PMMAE's for that particular age group.

To retain harmony with the federal method, RETBN.4 uses age groups as they stood in 1965. Because those people who will not be born until many years in the future must be considered, the range of these age groups is the group aged 65-69 in 1965 back to the group aged -46 to -50 in 1965. Those age groups 10-14 in 1965 to -46 to -50 stored in the non-positive partitions of the matrices so that these

age groups would not be involved in any partial calculations. The remaining age groups i.e. 15-19 to 65-69 in 1965 must be treated differently because they would not participate in the CPP for the full 47 years.

The transformed matrix of PMMAE's is given the name PINDIV and a similar transformation is done on matrix MMAE so that it becomes matrix INDIV. This latter operation is necessary for the subsequent calculation of earnings dropped out.

To find the sum of pensionable earnings for any age group up to the retirement age, all the values on the row are summed up. For those age groups that do not have a positive storage location, there will be 47 values. The other age groups will have fewer values e.g. age group 25-29 in 1965 will have 40 values to sum i.e. 65 minus 25. The calculation of death benefit factors is similar except that these factors must be calculated not only for age of death or retirement at 65 but also for death at ages 25, 30, 35, 40, 45, 50, 55, 60, and 65. The calculation of the factors for the different ages of death are done iteratively in a do-loop (NR). Thus when NR is set at value 8, this is the calculation of the death benefit factor at age 60; when NR = 7, the calculation is for death at age 55, etc.

The calculation of the factor is done by summing the years of participation in the CPP, (SUM), as described above, and then adapting this amount by various policy choices.

The first such variation is the drop-out provision of the Canada Pension Plan. Under the legislation, whenever the participation exceeds 10 years, the lowest 15 per cent of annual earnings levels are dropped from the sum in calculating retirement benefits.

This calculation takes place in subroutine MIN. Matrix INDIV is duplicated in the subroutine (DUP) and an exposure factor is determined for each age group given their years of participation (YRSPRT). Thus with a drop-out rate of 15 per cent and a maximum

participation of 47 years, the exposure factor would be 7.05 for that age group. Fewer years of participation yields a smaller exposure factor. For the retirement benefit calculation, any participation of less than ten years does not invoke the drop-out feature.

The calculation of earnings dropped out involves finding the lowest annual MMAE and summing these for each year up to the exposure factor. For example, with an exposure factor of 7.05, find the seven lowest MMAE's for the age group, sum them and then add .05 times the eighth lowest MMAE.

The subroutine does this in a series of do-loops where the lowest MMAE for the age group is determined and accumulated. This value is then increased by 5,000 so it will not be selected again and then the process is repeated to find the next lowest MMAE. This method continues until the lowest MMAE's are summed and the decimal part of the exposure factor is added. This amount is cumulated in matrix DROP.

It should be pointed out that no earnings are dropped out for females unless the drop-out rate exceeds 25 per cent. This is necessary because of the pattern of years of nil earnings. Because females will have more years of nil earnings than males, the drop-out provision is less important. However, should the drop-out rate increase substantially -- PENSIM uses all drop-out rates exceeding 25 per cent -- the drop-out factor becomes more significant and thus female earnings will be dropped out in the calculation as well.

Because subroutine MIN has altered the table of MMAE's in finding the lowest values, it is necessary to duplicate the INDIV matrix each time the subroutine is called.

After the drop-out values (DROP) are returned to the main program, they are multiplied by the lowest participation rate because the calculation of earnings dropped out did not use participating MMAE's. Similarly, only .5 of this value is used,to account for the

years of nil earnings that would exist during the years that the pensioner could have contributed, but did not.

The resulting amount of total pensionable earnings is determined by subtracting the earnings dropped out, where applicable, from the total pensionable earnings calculated previously.

Another factor that affects the retirement pension is the retirement rate. In the statutory formula, this rate is 25 per cent and this is the figure usually entered by the user when he initializes the program. To account for this factor, or use any alternative retirement rate, a vector calle TEM1 is calculated.

Each element in this vector is determined by multiplying the years of participation for each age group by the percentage of years not dropped out (the residual of the exposure factors) and then multiplying this product by the inverse of the retirement rate.

The inverse of this rate is used because the next step involves dividing the TEM1 value into the total pensionable earnings. In effect, total pensionable earnings are multiplied by the retirement rate and divided by the years of participation that remain after allowing for the drop-out factor. The amount so calculated is then multiplied by a disability factor (DSDRP) which allows for the years when contributions may not have been made because of disability. Once this calculation has been made, the result is the death benefit factor for that age group for death at the given age.

A slight variation occurs in the calculation of retirement benefit factors in that the factors for age groups 60-64, and 65-69, are averaged and then the disability drop-out rate is applied. This is done by creating a temporary vector called TEM.

The factors are then transformed from columns to rows so that further calculations can take place. The resulting matrix FACTOR contains the retirement/death benefit factor for each age group from 25-29 to 65-69 for every five years from 1970 to 2025.

In further calculations, the age group is collapsed from a five-year span to the median age. Thus age group 25-29 in the future will be represented by age 27½, etc. To achieve these values each pair of successive death benefit factors is averaged e.g. the factor for age 27½ is one-half the sum of factors for age group 25-29 and age group 30-34. The factor for age 22½ is determined by subtracting the factor for age 25 from age 27½ and deducting this difference from age 25 to get the resulting factor for age 22½. The matrix FACTOR now contains the factors for ages 22½ to 67½ in five-year intervals of age and time.

The method for the short-run calculation of these factors differs slightly and thus some changes are made at this point. Similarly, a linear interpolation is used to find the factors for every year based on the quinquennial value calculated previously. Thus the matrix now contains factors for ages 22½ to 67½ for every year from 1970 to 2025.

To determine the factors beyond age 65, it is necessary to use the value for 67½ and escalate these by an amount that allows for pension index ratios, the retirement rate, and YMPE levels. This is done in the vector ESC1 which is the first escalation factor. This file is calculated by finding the initial retirement pension for each year and dividing it by a ratio of pension indices where the pension index in 1967 for the purposes of calculation is 100.0.

Once these factors are calculated for each year, they are multiplied by the retirement/death benefit factor for age 67½ in that year and the escalated factor is then carried forward to older age groups by moving it forward in time. Thus the retirement/death benefit factor for age 67½ in 1980 say, is multiplied by the first escalation factor in 1980 and this escalated value is assigned to age group 67½ in 1980, age group 72½ in 1985, age group 77½ in 1990, etc. This process continues for every year and expands the matrix FACTOR out to the age group 90+.

The matrix FACTOR is then output onto the disk for use in programs WIDOW.6 and DISBN.7.

The next step in the method is the calculation of the death benefit costs. To find these costs, the number of deaths in each age group for every year is determined and multiplied by the appropriate death benefit factor. This is done in matrix NMDTH where for each year the appropriate mortality rate (1 - survival rate) is applied to each age group and sex population figure, and this multiplied by the proper death benefit factor.

This amount is summed for all ages up to age 62½, and this sum is then multiplied by the second escalation factor (ESC2) which reflects the amount of the initial retirement pension for each year, but does not include a pension index ratio because the death benefit factors up to age 62½ were not escalated.

The cost amounts for ages 67½ to 90+ are also summed and this time the total is multiplied by the pension index for the year because it was divided out in the calculation of the first escalation factor.

The two resulting sums for all age groups are then combined and multiplied by .5 to account for years of nil earnings. This amount is further reduced by a death reduction factor (DREDC) which allows for the ceiling on the death benefit of 10 per cent of the YMPE for the year or one-half of the annual imputed retirement pension. This amount is then totalled for both sexes and output onto the disk for use in program FUND.9 or may be produced in tabular form.

The calculation of retirement benefit costs requires over-writing that part of the FACTOR matrix for ages 65+ because of the slight differences in calculation of the retirement benefit factor. The method of escalation for ages greater than 65 is the same as for the death benefit factors, and again short-run values for these factors must be provided by matrix RFAC.

To account for the earnings test in age group 65-69, the retirement benefit factor for age 67½ is reduced by one-half for males and one-quarter for females. These are the values used by the Department of Insurance in its valuation. If the user wishes to omit the earnings test for his calculation, this section will not be called. Similarly, if the user wishes to alter the terms of existing earnings test, the programming can be changed to accommodate the new actuarial assumptions.

The calculation of the retirement benefit costs is done by multiplying the population for each age group, sex, and year by the appropriate retirement benefit factor and then multiplying this amount by the pension index to replace this value that was divided out in the calculation of the first escalation factor. These amounts are then summed for all age groups and for both sexes in each year. A short term factor is applied to account for the maturing aspects of the Canada Pension Plan until 1975 and the resulting cost amounts are output onto the disk as data for use in program FUND.9 or in tabular form where it is disaggregated by year and sex.

E. <u>POLICY VARIABLE INPUT</u>

During the execution of the program, the user is asked several policy questions. The first relates to the type of plan being tested. The response is one of the five mentioned above in chapter V i.e. RSCUR, MICUR, RSPRO, MIPRO, or TXFPB.

As mentioned earlier, this response automatically keys other data sources to the proper sets of economic assumptions i.e. reasonable stability or moderate inflation. The data required includes the pension index values, the values of reduction factors, and the YMPE levels.

Other policy variables that must be input include the retirement pension rate, the drop-out rate and the choice of whether to include the earnings test in the calculation of retirement benefit costs.

The final option to the user is the form of his output e.g. in data form for use in FUND.9 or in table form by year and sex.

F. OUTPUT FILES

Each execution of RETBN.4 produces three output files. The retirement benefit costs are prefixed "RT"; the death benefit costs are prefixed "DB"; and the death benefit factors are prefixed "DH". The suffix to each output file name is composed of three letters which will depend upon the plan being tested e.g. for moderate inflation with the proposed plan, the retirement benefit costs are output in file RTMIP.

Each file contains values for each year from 1970 to 2025 and represents total figures when in data form, or a breakdown by sex when in tabular form.

G. TELETYPE QUESTIONS

1) TYPE IN PLAN TO BE TESTED:

   Respond with one of the five-letter code words outlined in chapter V.

2) TYPE IN DROP-OUT RATE (0-1):

   Respond with a decimal value in the proper range. The statutory drop-out rate is .15.

3) TYPE IN RETIREMENT PENSION RATE (0-1):

   Respond with a decimal value in the proper range. The statutory retirement pension rate is .25.

4) DO YOU WANT EARNINGS TEST? (YES/NO):

   Respond with YES or NO. The earnings test is included in the Canada Pension Plan but may be omitted as a policy variable.

5) OUTPUT? (TABLE/DATA):

   Respond with TABLE or DATA. DATA is used when a full PENSIM run is being done to accommodate program FUND.9.

TABLE is used when a policy change is being tested on the retirement or death benefit alone.

6) ECONOMIC ASSUMPTION? (RS/MI):

When the user specifies a TXFPB plan, he must tell the program whether he wants reasonable stability or moderate inflation assumptions.

H. NOTES

This program has a built-in clock function that records the time used for execution (generally 15 seconds of CPU time) and this is output on the terminal when execution is completed. The program also types out the names of the disk files that are generated by the program.

Because of the number of vectors and matrices that are used in the program, most of which must be retained throughout, RETBN.4 requires 24K memory capacity when run on a PDP-10 and usually requires approximately five minutes of actual clock time to run.

A. INTRODUCTION

Program CONT.5 calculates the total contributions paid into the Canada Pension Plan from 1966 to 2025. This program can also be used to determine provincial contributions to the CPP for the same time span.

The program has the facility to test changes in the contribution rate and different methods of calculating the year's basic exemption. The output can be specified in a formatted file or a data file for use in program FUND.9.

B. VECTORS AND MATRICES

POP - is the population data matrix read in from data file ONE. Parts of this array are overwritten several times in the program.

MMAE - contains the modified modified average earnings matrix read in from the appropriate data file that matches the option to be tested.

ETADJ - contains the earnings test adjustment factors.

PART - stores the labour force participation rates for the population. There are two sets of participation rates for males; one for the years 1966 to 1985 and one for 1986 to 2025. There are two groups of four sets of participation rates for females; the first group for moderate inflation assumptions and the second for reasonable stability assumptions. The four sets are used for the year groupings 1966-1975, 1976-1985, 1986-2005, and 2006-2025 respectively.

ADJ - contains adjustment factors to account for the CPP overpayment that employers cannot claim.

TEMP - is a utility array.

CONRTE - contains the contribution rate for every year from 1966-2025.

C. INPUT FILES AND DATA STATEMENTS

The participation rates and adjustment factors stored in the matrices PART and ADJ were developed by the Department of Insurance and are entered in data statements.

The first two data files that are read in are keyed off the code word that the user types in response to the first question. The modified modified average earnings are read in from the output file produced by MMAE.3. The appropriate YMPE's are read in from the output file produced by INDEX.2.

The remaining data are read in from files ONE and OPSHN. ONE contains all the population statistics produced by POP.1. OPSHN is an option file that enables the user to test various methods of calculating the YBE and contribution rates. The first three values read in are associated with the variable names X1YBE, KX1, and X2YBE. The first entry, X1YBE, is the value of the flat rate YBE in dollars. If, as in the proposed plan, a flat rate YBE is to be tested, it would be set at 600. The third entry, X2YBE, is the value of the ratio used in calculating the YBE as a constant proportion of the YMPE. The second entry, KX1, is a switch that allows the user to test either method of calculating the YBE with any of the plans. The table below outlines the switch values for various YBE options.

Code	Proportional	Flat Rate
RSCUR	KX1 = 1	KX1 = 3
MICUR	KX1 = 2	KX1 = 4
RSPRO	KX1 = 3	KX1 = 5
MIPRO	KX1 = 4	KX1 = 1
TXFPB	KX1 = 5	KX1 = 2

If the user wishes to understand the mechanics of this switch he should refer to statement 999 and the vector FILE in the program listing.

If a flat rate option is being tested, the value of X2YBE, the proportional rate must be set at .12 and if a proportional rate is being tested, the value of X1YBE must be set at 600. This step is necessary if the user requires detailed contribution tables for output because the correct titles are keyed off these values. If the output is a data file which is read in for the fund calculation, this step can be ignored.

The last sixty values (ten per line) stored in OPSHN are the contribution rates. They are stored as decimal fractions e.g. .036. This method of entering the contribution rate allows the user to specify any contribution rate that is desired in any year. For a MIPRO run say, the contribution rates would all be .036. If the user wishes to test the effects of changing the contribution rate to .046 in 1986 and beyond, then the twenty-first to sixtieth values would be .046.

D. METHODOLOGY

Since the volume of contributions paid into the CPP are based on a percentage of contributory earnings for the employed population, the basic goal of the program is to estimate contributory earnings on an annual basis. The first step towards this goal is to calculate the earnings that are exempted from contributions. This is accomplished by computing the YBE for every year by the method that has been specified by the user.

The labour force participation rates are then multiplied by the population statistics to determine the employed labour force through time. The working population is subsequently multiplied by modified modified average earnings to obtain age grouped earnings through time. Since the first age group includes individuals aged 15-19, it must be scaled to exclude those who are 15, 16 and 17. Two scale factors - .39 and .4 - are used, the first for years before 2000, and the second for the remainder.

At this point, the age grouped earnings are totalled by year. These annual total earnings are still in 1966 constant dollar terms because the modified modified average earnings were deflated in the program MMAE.3. It is here that the economic assumptions enter the calculation of total contributions. The grouped earnings are multiplied by a growth index derived by dividing the YMPE in 1966 (5,000) into the YMPE of the appropriate

year. In other words, this growth index is similar to the earnings index which is specified by the user in the program INDEX.2. Thus, whatever the assumptions made concerning the earnings index, they are reflected in the YMPE's and consequently, the earnings totals for each year.

Annual contributory earnings are then calculated by multiplying the YBE by the participating population, totalling the values for each year and subtracting them from the escalated earnings. An adjustment factor is included to account for CPP overpayments.

Finally, contributory earnings are multiplied by the contribution rate vector, CONRTE, to calculate annual contributions to the CPP. The remainder of the program sets up the format for the output files.

E. POLICY VARIABLE INPUT

The YMPE's used in the program are keyed from the code word that is entered in response to the first question in the program.

As explained above in section C, the method of calculating the YBE and the contribution rates are specified in the file OPSHN.

F. OUTPUT FILES

CONT.5 produces a maximum of two output files. Each output file is optional. The program will ask the user if he desires table output which contains the annual contribution rate, contributions for males and females, total contributions and the growth in total contributions. In addition, the user can specify data output for the fund program. The table output will be placed in a file called CONT. The data output is placed in a file that matches the code word entered at the beginning of the program.

RSCUR	-	RSCCN
MICUR	-	MICCN
RSPRO	-	RSPCN
MIPRO	-	MIPCN
TXFPB	-	TFPCN

The output data file stores total contributions by year.

G. TELETYPE QUESTIONS

The user must respond to all teletype questions for execution to continue.

1) TYPE IN PLAN TO BE TESTED:

Respond with one of the five-letter code words outlined in chapter V. If the user misspells one of these words, the terminal will reply, for example, RXPRO?, TRY AGAIN.

2) OUTPUT? (TABLE/DATA):

If the tabular output is desired, respond with TABLE; if a data file is desired, respond with DATA; and if both are desired, respond with BOTH.

H. NOTES

CONT.5 requires one change if provincial contributions are to be forecast. It is necessary to supply a set of labour force participation rates that are appropriate for the province in which the contributions are being made.

VIII WIDOW.6

A. INTRODUCTION

The purpose of this program is to generate values for widows' benefits paid out under the Canada Pension Plan for the period 1968-2025. The method used in computing values is identical to the method used by the federal Department of Insurance with a few exceptions. These exceptions are due mainly to the fact that WIDOW.6 performs the calculations in one-year intervals whereas the Department of Insurance uses five-year intervals.

The program was designed for maximum flexibility so that the user may test numerous schemes, including the four schemes outlined in the Actuarial Report (1969). When running the program from a terminal, the program generates certain questions which the user must answer. The answers supplied by the user instruct the program as to which scheme is to be tested.

B. VECTORS AND MATRICES

AGEDIS - this matrix contains coefficients for the distribution of wives by age for each age group of males.

COEFF - this matrix stores the number of surviving widows for each year of widowhood by age group.

DEATHS - this vector stores the number of male deaths for any given year by age group.

DTHFC - this matrix contains the male death benefit factors created in the program RETBN.4 (see Chapter VI).

ERBO65 - this vector stores the earnings-related benefits for widows 65 years of age and over.

ERBU65 - this vector stores the earnings-related benefits for widows under 65 years of age.

ESC1 - this vector contains the escalation coefficients for each year from 1968 to 2025.

ESCDBF - this vector contains the escalated male death benefit factors for a given year for each age group.

FAC68 - this vector contains the male death benefit factors for 1968 for the first 10 age groups. The factors are not calculated in RETBN. 4 for 1968-69. Hence the federal Department of Insurance figures are inserted. 1969 factors are interpolated from 1968 and 1970 factors.

FFAC - this vector contains the female death benefit factors for each year from 1968 to 2025.

FRBU65 - this vector stores the flat rate benefits for widows under 65 years of age.

MAXPEN - this vector stores the maximum pension receivable in each year from 1968 to 2025.

PNIND - this vector contains the pension indices for each year from 1967 to 2025 (1967 = 100.0).

POP - this matrix contains population figures and age distribution for males for each year 1966-2025.

PRPMRD - this matrix contains coefficients indicating the proportion of males that are married by age group for different periods in time.

PWEWB - this matrix contains coefficients indicating the proportion of widows eligible for widows benefits by age group for each year 1968-2025.

PWNRP1
PWNRP2 - these vectors contain coefficients indicating the proportion of widow beneficiaries not receiving retirement pensions by age group for years of widowhood 1968-69 (PWNRP1) and 1970 + (PWNRP2).

PMARRY - this matrix contains probabilites that a widow will remarry by age group and for different periods in time.

STOTAL - this vector stores the averages by widow's age group, of the number of male deaths weighted by the escalated male death benefit factor for each male age group.

SURVIV - this matrix contains the quinquennial survival probabilities of widows by age group for different periods in time.

SURVM - this matrix contains the one-year survival probabilities for males by age group for different periods in time.

YMPE - this vector contains the year's maximum pensionable earnings for each year 1966-2025.

OAS - this is a 3-element vector containing

1) the annual flat rate payment for the current plan
2) the annual flat rate payment for the proposed plan beginning in 1973
3) the user-specified proposed flat rate payment beginning in the year specified by the user.

ERPCTU
ERPCTO - these vectors are each 3-element vectors containing the percentage of the benefit that is earnings-related for widows under 65 (ERPCTU) and for widows 65 and over. The order is as follows:

1) the percentage under the current plan
2) the percentage under the proposed plan to begin in 1973
3) the user-specified percentage beginning in the year specified by the user.

C. INPUT FILES AND DATA STATEMENTS

This program reads in numerous data files, some of which are dependent on the scheme being tested and some of which are not.

Those input files which are independent of the scheme being tested are:

ONE
SURVM
REMAR
SURVP
PWEWB

The names associated with each of the schemes that the program can test are:

1)	RSCUR	reasonable stability current plan
2)	MICUR	moderate inflation current plan
3)	RSPRO	reasonable stability proposed plan
4)	MIPRO	moderate inflation proposed plan
5)	TXFPB	all other plans

For each scheme, three additional files are read in.

For RSCUR:	RSCUR RSPNX DHRSC
For MICUR:	MICUR MIPNX DHMIC
For RSPRO:	RSPRO RSPNX DHRSP
For MIPRO:	MIPRO MIPNX DHMIP
For TXFPB:	TXFPB TFPNX DHTFP

Those variables which are initialized in data statements in the program are:

ACEDIS
FAC68
FFAC
PRPMRD

The user is reminded that before he can run the WIDOW.6 program, he must run the programs POP.1, INDEX.2, MMAE.3, and RETBN.4 (see chapters III - VI for instructions).

D. METHODOLOGY

As mentioned earlier, the method used in this program is identical to that used by the federal Department of Insurance with a few differences. These differences are outlined in later paragraphs of this section.

The program uses the year of widowhood as the basis for all calculations, performing all calculations separately for each year of widowhood. The first task of the program is to determine the number of women who become widows in any given year. This requires the calculation of the number of male deaths in that year (calculated as the difference between the size of the male population in that year and the number of males who survive until the next year). The number of widows is simply the proportion of those males who were married at the time of their death. The next step is to compute for this year of widowhood the number of widows that are still alive in each of the succeeding years until 2025. This is accomplished by applying survival probabilities to the number of widows for various age groups and for various periods in time.

To this point in the program, the methods of this program and of the Department of Insurance are identical with the exception that the program performs calculations in one-year intervals rather than five-year intervals. However, since many of the coefficients of probability for survival and remarriage etc. used in the program are available only in five-year intervals, values for these coefficients for the missing years are interpolated linearly within the program.

Having computed the number of surviving widows, the actual benefits can be calculated. It is at this point that the most striking difference between the two methods (WIDOW.6 versus the Department of Insurance) occurs. This will become apparent in the following paragraphs.

As mentioned before, the basis for all calculations is the year of widowhood. The Department of Insurance performs calculations in five-year intervals (1970, 1975, 1980, etc.) with one exception (1968). The Department of Insurance divides the ages of the widows in any year of widowhood into 16 age groups (under 20, 20-24, 25-59, ..., 80-84, 85-89, 90 and over). With the exception of the first and last, these age groups are five-year groups. WIDOW.6 can perform calculations for every year of widowhood from 1968 to 2025 (one-year intervals). However, the five-year age groups for widows defined above are retained in WIDOW.6 since the interpolated population projections used by WIDOW.6 were prepared using these five-year age groups. The use of five-year intervals and five-year age groups is an obvious computational convenience. The only problem case is for 1968. WIDOW.6, with its one-year intervals, must make certain assumptions before proceeding with the calculations.

As an example, consider the calculation of the flat rate portion of the widows' benefit. This payment is made only to widows under the age of 65 (at age 65, this is replaced by the Old Age Security). Hence, the flat rate benefit is concerned only with the first ten of the sixteen age groups defined above (from under 20 up to 60-64). The flat rate benefit for any age group in a given year is the product of the number of surviving widows in that age group for that year, the percentage of widows in that age group who are eligible for widows' benefits, and the user-specified value of the flat rate payment. The total flat rate benefit for that year is the sum of the flat rate benefits for each age group.

For the year of widowhood 1970, the Department of Insurance computes flat rate benefits for the years 1970, 1975, 1980, etc. (five-year intervals). For 1970, the calculation will include the age group 60-64. But, in 1975, the surviving widows of this age group will be five years older (i.e. in the 65-69 age group) and will receive OAS. However, the surviving widows of the 55-59 age group in 1970 will be

60-64 in 1975. Similarly, the 50-54 age group in 1970 will be 60-64 in 1980, and so on. Hence, for the year of widowhood 1970, the flat rate benefit calculation will include all age groups up to and including 60-64 in 1970, 55-59 in 1975, 50-54 in 1980, and so on. Similar statements can be made for the years of widowhood after 1970 as computed by the Department of Insurance. The year of widowhood 1968 is the only problem year. The Department of Insurance calculates benefits for 1968, 1970, 1975, 1980, etc. Consider those widows in the 60-64 age group in 1968. In 1970, the surviving widows of this group will be two years older. This would place them in a 62-66 age group. Since no 62-66 age group has been defined, the Department of Insurance assumes that 40 per cent (those aged 65 and 66) of the widows are receiving OAS in 1970 and that 60 per cent (those aged 62, 63, 64) of the widows are still in the 60-64 age group. Similarly, in 1975, the surviving widows for the 55-59 age group of 1968 are 62-66 years old. The same sixty-forty treatment is applied in this case.

WIDOW.6 uses similar assumptions, but on a much more widespread basis. For the year of widowhood 1968, WIDOW.6 calculates benefits for each year from 1968 on. Consider those widows in the 60-64 age group in 1968. In the years from 1969 to 1975, the surviving widows of this group will be in the age groups 61-65, 62-66, 63-67, 64-68, 65-69, 66-70, and 67-71, respectively. Hence, in 1969 only 80 per cent of the surviving widows will receive flat rate benefits, in 1970 60 per cent, in 1971 40 per cent, and in 1972 20 per cent. By 1973, all of the surviving widows of the 60-64 age group will be 65 or over and will receive no further flat rate benefits. But, the survivors of the 55-59 age group of 1968 make up the 60-64 age group in 1973. Thus it starts all over again. In 1974, only 80 per cent of the surviving widows (of the 55-59 age group of 1968) will receive flat rate benefits and so on.

This is the method used by WIDOW.6. It has the advantage that it treats all years of widowhood in the same manner. There are no special cases for special years.

A further comparison of the two methods can be obtained by examining one of the worksheets prepared by the Department of Insurance. Consider the worksheet for the year of widowhood 1968. On that section of the page dealing exclusively with the calculation of the benefit, there is a "diagonal" line running from the top right-hand corner to the bottom left-hand corner. This line moves downwards in steps of five years for each five-year age group when moving from right to left on the page. If the "diagonal" line associated with the WIDOW.6 method were superimposed on the sheet, it would move downwards in five steps of one year each for each five-year age group when moving from right to left on the page.

The earnings-related portion of the widows' benefits has two components. First, the payment to widows under the age of 65 for any given year is dependent upon the number of widows surviving in that year and upon the user-supplied percentage of benefits that are earnings-related. Second, the payment to widows 65 years of age and over is calculated in a similar manner to the under 65 payment. However, since a known proportion of widows 65 and over are receiving other forms of retirement pensions, their earnings-related benefit is reduced by a certain factor. This factor, called the reduction factor, is calculated in WIDOW.6 using the same method as the Department of Insurance.

The discussion in earlier paragraphs pertaining to the differences in the two methods of calculating the flat rate benefit applies equally to the earnings-related benefits. Widows under the age of 65 receive the flat rate payment and the earnings-related payment. Widows 65 years of age and over receive OAS and an earnings-related payment (which may be reduced by a reduction factor).

The last step in the program is the actual "adding up" of the benefits calculated for each year of widowhood to arrive at the total benefits (both flat rate and earnings-related) paid out for each year in the period 1968 to 2025. The "adding up" procedure of the Department of Insurance requires the use of a high order interpolation formula with pre-determined weights. WIDOW.6, due to its design, requires only a simple addition of numbers.

E. POLICY VARIABLE INPUT

Most of the policy variables which influence the calculation of the widows' benefits are initially specified when running INDEX.2, MMAE.3, and RETBN.4. However, certain policy variables are unique to WIDOW.6. First of all, the user specifies a new proposed annual flat rate payment and the year he wishes that it begin. Also, the user specifies new percentages of benefits that are earnings-related for widows under 65 years of age and for widows 65 and over. Under the current plans the program assumes that the annual flat rate is 300 dollars and that it does not change. Under the proposed plan, the program assumes that the annual flat rate becomes 960 dollars in 1973. Under the current plan, the program assumes that the percentages of benefits that are earnings-related for widows under 65 and for widows 65 and over are 37.5 and 60 per cent respectively, and that they do not change. Under the proposed plan, these percentages both become 75

F. OUTPUT FILES

Each run of this program produces one output file. The name of the output file depends on the plan being tested.

RSCUR	-	RSCWD
MICUR	-	MICWD
RSPRO	-	RSPWD
MIPRO	-	MIPWD
TXFPB	-	TFPWD

In addition, when the run is complete, a message will be printed on the terminal giving the "END OF RUN" statement, the CPU time required for the run, and the name of the output file.

G. TELETYPE QUESTIONS

1) TYPE IN PLAN TO BE TESTED -

The user types in one of the 5 possible 5-digit codes mentioned in chapter V depending on the plan to be tested.

1a) TYPE IN GROWTH RATE FOR AVERAGE EARNINGS AFTER 1975 (e.g., FOR 5.5%, TYPE 1.055) ---

This question appears only if TXFPB is specified above, and is self-explanatory. The program assumes that for reasonable stability, the value is 1.035, and that for moderate inflation the value is 1.055.

2) TYPE IN RETIREMENT PENSION RATE (0-1) ---

Generally, the answer to this question is 25 per cent. Hence, the user must type in .25 (i.e. in decimal form).

3) TYPE IN STARTING YEAR (DEFAULT IS 1968) ---

The user types in the year of widowhood for which calculations are to begin. The year must be in the range 1968 to 2025 inclusive.

4) TYPE IN PROPOSED ANNUAL FLAT RATE PAYMENT, AND THE YEAR IT BEGINS ---

See chapter VIII, section E for the program's basic assumptions about flat rate payments.

The following is a list of suggested user responses depending on the scheme being tested:

i) If the user is running a current plan (RSCUR or MICUR), he should type in 300, 1968 in response to this question.

ii) If the user is running a proposed plan (RSPRO or MIPRO), he should type in 960, 1973 in response to this question.

iii) If the user is running a different plan, he can specify other proposals. For example, under RSPRO, MIPRO, or TXFPB, if the user types in x,y where y> 1973, then the program will generate flat rate payments of 300 dollars beginning in 1968, 960 dollars beginning in 1973, and x dollars beginning in the year y.

5) TYPE IN PERCENTAGE (BETWEEN 0 AND 1) OF BENEFIT THAT IS EARNINGS RELATED

(1) FOR WIDOWS UNDER 65 ---

(2) FOR WIDOWS 65 AND OVER ---

BEGINNING IN THE YEAR

See chapter VIII, section E for the programs's assumptions about earnings-related benefits.

The following is a list of suggested user responses depending on the scheme being tested:

i) If the user is running a current plan (RSCUR or MICUR), he should type in

.375
.6
1968

in response to this question.

ii) If the user is running a proposed plan (RSPRO or MIPRO), he should type in

.75
.75
973

in response to this question.

iii) If the user is running a different plan, he can specify other proposals. For example, under RSPRO, MIPRO or TXFPB, if the user types

x
z
y

where y>1973 and 0<x,z<1, then the program will generate earnings related payments according to the following percentage (expressed as decimals):

	Widows under 65	Widows 65 and Over
Beginning in 1968	.375	.6
1973	.75	.75
y	x	z

H. NOTES

The program consists of a main program and one subroutine, entitled REDFAC. The purpose of this subroutine is to compute the reduction factors for the calculation of the earnings-related benefit for widows 65 years of age and over.

The program requires 12K of core and generally uses about 80 seconds of CPU time for complete execution. When running the program, the user, after answering all questions, may have to wait as long as five minutes (clock time) before receiving the 'END OF RUN' message. This delay is normal and its length depends on the workload in the computer.

When preparing to run this program, it is recommended that the user make use of the Run Sheet for the program.

The WIDOW.6 program does not produce results that are identical to those produced by the federal Department of Insurance. The reason for these differences is related directly to the different time intervals for which the calculations have been made (WIDOW.6 covers a one-year interval while the Department of Insurance covers a five-year interval).

IX DISBN.7

A. INTRODUCTION

Program DISBN.7 calculates the disability pensions in the PENSIM model. It also calculates the pension paid to the husband or wife of a disabled contributor if the proposed scheme is being tested or if the user desires it as an option in some other scheme. The program has the facility to test different flat rate payments and different ratios of the imputed retirement pension for the earnings-related portion of the disability pension.

B. VECTORS AND MATRICES

POP - contains the population data read in from ONE.

DTHFAC - contains the death factors beginning in age group 20-24 and incrementing in five-year intervals to the 90+ age group. These factors are a result of output produced by RETBN.4.

PRVRTE - stores two sets of disability prevalence rates. The first set is used for the earnings-related calculation and was developed by the Department of Insurance. The second set is used for the calculation of the flat rate disability benefits and is found in Schedules 2 and 3 of the 1964 Actuarial Report.[4] In each set there are six quinquennial year groupings and nine age groupings. The values for 1975 are used from 1970 to 1979.

DISINS - contains four proportions indicating the ratio of contributions made by persons insured for disability. The first is for males and the remaining three are for females and pertain to the years 1970-1979, 1980-1989 and 1990+ respectively.

PROP - contains ten sets of proportions of total population insured for disability benefits. These are used in the flat rate calculations. The first two sets are for males for the years 1970-1989 and 1990+ using reasonable stability or moderate inflation assumptions. For females there are two groups of four sets each, one group for moderate inflation and one group for reasonable stability. The four sets pertain to the year intervals 1970-1979, 1980-1989, 1990-2009, and 2010+ respectively. The other dimension of the array is for the nine age classes which are:

20 - 24	45 - 49
25 - 29	50 - 54
30 - 34	55 - 59
35 - 39	60 - 64
40 - 44	

---

[4] Department of National Health and Welfare, The Canada Pension Plan: Actuarial Report, November 1964, p. 81.

DISFR - stores the disability flate rate calculations.

YMPE - contains the appropriate YMPE's for the scheme being tested.

PNIND - contains the pension index that corresponds to the scheme being tested.

DISERN - stores the disability earnings-related calculations.

PHWHWC - is an acronym for proportion of husbands and wives at home with children. The vector is used in the computation of wives' benefits and was developed by the Department of Insurance.

FACTOR - contains the proportion of wives entitled to wives' benefits.

FMTH65 - contains the number of females per 1000 married to husbands over age 65 who were disabled at age 65 and continue to meet the disability test. This data was developed by the Department of Insurance.

WIFEBN - is used in the calculation of wives' benefits.

OAS - is a vector which contains the current plan flat rate payment in 1968, the proposed plan flat rate payment in 1973 and a user-specified flat rate.

C. INPUT FILES AND DATA STATEMENTS

There are four data files read into DISBN.7. As in other programs in the PENSIM model, three of these files are keyed from the code word entered at the beginning of the program. These three files contain the death benefit factors, YMPE's and the pension indices respectively. The code words govern the following files:

YMPE	DEATH BENEFIT FACTORS	PENSION INDEX
RSCUR	DHRSC	RSPNX
RSPRO	DHRSP	
MICUR	DHMIC	MIPNX
MIPRO	DHMIP	
TXFPB	DHTFP	TFPNX

In addition the population data is read in from file ONE.

D. METHODOLOGY

The initial operation of the program is common to both the computation of earnings-related and flat rate pensions. The first age group is scaled to account for those participants who are in the 22-24 group. Subsequently, the population is multiplied by the

appropriate prevalence rates to determine the numbers of persons to whom the disability pension will apply. At this point the two calculations diverge. The earnings-related portion of the disability benefit is multiplied by the death benefit factor to incorporate a lifetime earnings relation for the imputed retirement pension. The flat rate portion is multiplied by the proportion insured for disability to determine total recipients of the flat rate portion in every year. These values are then copied into another matrix for use in the wives' benefit calculation.

Both benefits are then totalled for all the age groups for each year. The costs are determined by multiplication by the annual flat rate amounts for the flat rate portion and by the ratio of the imputed retirement pension for the earnings-related portion. The latter is escalated by the growth rate of the three-year moving average of the YMPE's and the former by the pension index.

If the user desires a wives' pension, he indicates this to the computer in response to a teletype question. Since the number of wives under 65 whose husbands have been disabled has been calculated it is only necessary to compute the number over 65. To accomplish this the number of females over 65 is multiplied by the ratio indicating the number of females married to husbands over 65 who were disabled at age 65 and continue to meet the disability test. It is now necessary to determine the number of wives with disabled husbands who have children. By multiplying the total number of wives with disabled husbands by the proportion of husbands and wives at home with children, the number of wives eligible for the benefit is determined. The annual flat rate pension is multiplied by these values to cost the benefit.

E. POLICY VARIABLE INPUT

Economic assumptions are entered in the model through the input of the YMPE's and the pension indices. If the user is running a TXFPB option, the program inquires if moderate inflation or reasonable

stability assumptions are desired. With this information the program can use the appropriate proportion of the total population insured for disability.

The choice of the proper YMPE and pension index keys off the initial code word entered.

YMPE	PENSION INDEX
MIPRO	MIPNX
MICUR	
RSPRO	RSPNX
RSCUR	
TXFPB	TFPNX

During the courses of execution of the program the user must indicate the flat rate value of disability benefits and the ratio of the retirement pension for the earnings-related portion.

F. OUTPUT FILES

The program produces two output files; the first for disability benefits and the second for wives' benefits. The output file for disability benefits stores the earnings-related portion first and then the flat rate portion. If no wives' benefits are desired, as in the current plan, then this output file is filled with zeros. The output files produced are:

YMPE CODE	DISABILITY PENSION	WIVES' PENSION
RSCUR	DSRSC	RSCWF
MICUR	DSMIC	MICWF
RSPRO	DSRSP	RSPWF
MIPRO	DSMIP	MIPWF
TXFPB	DSTFP	TFPWF

The values stored in these files are for the years 1970 to 2025.

G. TELETYPE QUESTIONS

Before execution will continue the user must respond to the following questions:

1) TYPE IN PLAN TO BE TESTED:

Respond with one of the five-letter code words outlined in

chapter V. If the user misspells one of these words, the terminal will reply for example, RXPRO? TRY AGAIN.

2) ECONOMIC ASSUMPTION - (RS/MI):

Respond with reasonable stability (RS) or moderate inflation (MI). This question is asked if the TXFPB option is specified.

3) ANNUAL FLAT RATE BENEFIT AND YEAR IT BEGINS:

Respond with a value for the flat rate benefit and the year this benefit is to commence. For example, if the annual flat rate is to be $2000 in 1990, type in 2000. 1990. If the user is running a current plan option the flat rate is set at $300 until the year the user wishes to change it. If it is not to be changed, 300. 1970 should be typed in. If the user is running a proposed plan option the flat rate is set at $300 up to 1973, $960 from 1973 to the year the user wishes to change it. If 2000. 1980 was entered, the costing would use the following values in the years indicated:

$ 300	1970 - 1972
$ 960	1973 - 1979
$2000	1980 - 2025

If no change is to be made in the proposed plan, the user would enter 960. 1973. When a TXFPB option is specified, the following additional questions result.

3a) FLAT RATE - (CURRENT/PROPOSED):

If current is entered the flat rate payment option will operate as the current plan in question 3. If proposed is entered, the option will operate as the proposed plan.

4) WIVES' BENEFITS (YES/NO):

Self-explanatory response.

5) RATIO OF IMPUTED RETIREMENT PENSION AND YEAR IT BEGINS:

Follow the same procedure as for question 3.

5a) EARNINGS RELATED - (CURRENT/PROPOSED)

Follow the same procedure as for question 3a.

H. NOTES

In section G there is no question pertaining to the amount of the wives' benefits. They are always assumed to be identical to the flat rate disability pension except in the case where there is no wives' benefits at all. If the user wishes to alter wives' benefits to some other value, a programming change is necessary to DISBN.7. As it currently operates, DISBN.7 calculates wives' benefits on the basis of $960 in 1973 and escalates it to the year that a change takes place. If a current plan is specified, there should be no wives' benefits. If these benefits are specified and current option is in effect, the wives' pensions will be set at $960 until it is changed.

X CHILD.8

A. INTRODUCTION

CHILD.8 is the eighth program in the PENSIM model. It calculates the benefit costs for children who have been orphaned by the death of their father (regardless of whether their mother survives) and for children whose fathers have been totally disabled.

The program calculates these benefits under various user specified options. Benefits are projected for the years 1968 to 2025 for orphans and for the years 1970 to 2025 for children of disabled beneficiaries.

B. VECTORS AND MATRICES

DUMMY - is a dummy vector which is used to skip over the population data that is not needed in the program.

POP - contains the population data read in from the data file ONE. Only the first four age groups of each sex are used. They are:

0 - 4
5 - 9
10 - 14
15 - 19

PROB - contains the probabilities of being an orphan for the four age groups. The probabilities are for the years 1968, 1970, 1975, 1980 etc. to 2025 in five-year intervals. These probabilities were developed by the Department of Insurance, Ottawa.

PNIND - contains the appropriate pension index.

ADJ - contains adjustment factors to scale the first five years of orphans benefits so that they will be in line with actual trends.

SDFIFD - contains the percentage of surviving disabled fathers insured for disability for the first four age groups and for the years 1975, 1980, 1990, 1995 and 2000 plus. This data was developed by the Department of Insurance.

PROB1 - contains the linearly interpolated values of PROB for the years 1968 to 2025.

PROB2 - contains the linearly interpolated values of SDIFID for the years 1970 to 2025.

ORPHBN - is used for the calculation of orphans' benefits.

CHLDBN - is used for the calculation of children's benefits.

YEAR - contains the years 1968 to 2025.

FILE - contains the input key words and output data file titles.

C. INPUT FILES AND DATA STATEMENTS

The contents of the arrays SDFIFD and PROB are entered in data statements at the beginning of the program.

The first data read in are the population statistics. The first four age groups for males are read in; the remaining statistics for males are skipped and then the first four age groups for females are read in. Subsequent to reading the population statistics, the program reads in the user specified pension index.

D. METHODOLOGY

The program contains two logically separate sections; the first calculates orphans' benefits and the second calculates children's benefits. One of the first operations common to both sections is a scaling of the age group 15-19. Since the CPP makes payments to children who are less than 18, it is necessary to scale this age group. The scale factor used is .6.

After the scaling the program begins to calculate orphans' benefits. Since the probabilities of being an orphan are given in five-year intervals, it is necessary to interpolate values for the years between the intervals. The program uses a linear method to interpolate these values. To calculate the number of orphans in any year, these probabilities are multiplied by the corresponding population statistics. The number of orphans are then totalled for each age group. To cost the benefits, the annual payment made to orphans is multiplied by the number of orphans.

The calculation of children's benefits is very similar. Instead of interpolating probabilities of being an orphan, the percentage of surviving disabled fathers insured for disability are interpolated using the same method as before.

Economic assumptions enter the computation via the pension index which escalates the annual benefits paid to orphans and children.

E. POLICY VARIABLE INPUT

As in previous programs in the PENSIM model, CHILD.8 expects one of the five code words before execution will continue. Unlike other programs, CHILD.8 does not read in the YMPE's. The only policy variable the program uses is the pension index. Two assumptions are implied in this index. If the options being tested assume moderate inflation, then the pension index will grow at its current two per cent maximum. In addition, the maximum can be altered to suit the user's options. These assumptions are specified in the program INDEX.2. The code words call the following files for the pension index:

MIPRO
MICUR - MIPNX

RSPRO
RSCUR - RSPNX

TXFPB - TFPNX

During the course of execution of the program, the user must indicate the flat rate values of the orphans' and children's benefits so that the costs of these benefits can be calculated.

F. OUTPUT FILES

The program produces one output file that contains the calculated values for both orphans' and children's benefits. In the output file, the fifty-eight values for orphans' benefits are output first, followed by the fifty-eight values for children's benefits. The program calculates values for orphans' benefits from 1968 to 2025 while children's benefits are calculated from 1970 to 2025. As a result, the first two entries of the children's benefits are zero.

The name of the output file produced is keyed off the original code word.

RSCUR	-	RSCCH
MICUR	-	MICCH
RSPRO	-	RSPCH
MIPRO	-	MIPCH
TXFPB	-	TFPCH

G. <u>TELETYPE QUESTIONS</u>

For execution to continue the following questions must be answered.

1) TYPE IN PLAN TO BE TESTED:

   Respond with one of the five-letter code words outlined in chapter V. If the user misspells one of these words, the terminal will reply for example, RXPRO?,TRY AGAIN.

2) ENTER ANNUAL VALUE OF ORPHANS BENEFIT AND YEAR IT BEGINS

   Respond with a value for orphans' benefit and the year this benefit is to begin. For example, if the user wishes the orphans' benefit to be changed to $600 a year in 1980, type in 600. 1980. If the current level of benefits are to be maintained, type in the unescalated amount in 1968 i.e. 300. 1968. If the user enters some value for 1980, the program automatically escalates $300 until 1979.

3) ENTER ANNUAL VALUE OF CHILDRENS BENEFIT AND YEAR IT BEGINS

   Follow the same procedure as for question 2.

XI FUND.9

A. INTRODUCTION

The purpose of this program is to generate summary tables for the Canada Pension Plan Fund for the period 1970-2025. The program takes as its input, the output files of the five programs described in chapters VI-X and calculates total benefits, expenses of administration and an annual value for the fund. The method used in making all calculations in this program is identical to the method used by the federal Department of Insurance.

When running the program from a terminal, the program generates certain questions which the user must answer. The answers supplied by the user instruct the program as to which plan is being tested and provide useful information for the output tables.

B. VECTORS AND MATRICES

AIESPY - is a 56-element vector containing annual figures (1970-2025) for the interest earned since the preceding year on outstanding investments.

ANNINT - is a 60-element vector containing annual figures (1966-2025) for the total amount of interest collected since the CPP fund began in 1966.

CHILD - is a 56-element vector containing annual figures (1970-2025) for children's benefits (see chapter X).

CPPCN - is a 56-element vector containing annual figures (1970-2025) for contributions to the fund (see chapter VII).

DHBEN - is a 56-element vector containing annual figures (1970-2025) for death benefits (see chapter VI).

ERDSB - is a 56-element vector containing annual figures (1970-2025) for earnings-related disability benefits (see chapter IX).

ERWID - is a 56-element vector containing annual figures (1970-2025) for earnings-related widows' benefits (see chapter VIII).

FRDSB - is a 56-element vector containing annual figures (1970-2025) for flat rate disability benefits (see chapter IX).

FRWID - is a 56-element vector containing annual figures (1970-2025) for flat rate widows' benefits (see chapter VIII).

MATURE - is a 56-element vector containing annual figures (1970-2025) for the value of loans that are paid back in each year.

ORPHAN - is a 56-element vector containing annual figures (1970-2025) for orphans' benefits (see chapter X).

RATE - is a 56-element vector containing annual figures (1970-2025) for the interest rate charged on investments made in each year.

RTBEN - is a 56-element vector containing annual figures (1970-2025) for retirement benefits (see chapter VI).

TOTAL - is a 56-element vector containing annual figures (1970-2025) for total benefits and expenses of administration.

TOTINV - is a 60-element vector containing annual figures (1966-2025) for the total amount available for investment.

WFDSB - is a 56-element vector containing annual figures (1970-2025) for wives' disability benefits (see chapter IX).

CNRATE - is a 60-element vector containing annual contribution rates (1966-2025).

C. INPUT FILES

The input files to FUND.9 are all dependent on the plan being tested. For the five types of plans available, namely

Reasonable stability current plan	-	RSCUR
Moderate inflation current plan	-	MICUR
Reasonable stability proposed plan	-	RSPRO
Moderate inflation proposed plan	-	MIPRO
All other plans	-	TXFPB

The input files are:

	RSCUR	MICUR	RSPRO	MIPRO	TXFPB
Contributions	RSCCN	MICCN	RSPCN	MIPCN	TFPCN
Retirement benefits	RTRSC	RTMIC	RTRSP	RIMIP	RTTFP
Death benefits	DBRSC	DBMIC	DBRSP	DBMIP	DBTFP
Widows' benefits	RSCWD	MICWD	RSPWD	MIPWD	TFPWD
Disability benefits	DSRSC	DSMIC	DSRSP	DSMIP	DSTFP
Wives' benefits	RSCWF	MICWF	RSPWF	MIPWF	TFPWF
Children's & orphans' benefits	RSCCH	MICCH	RSPCH	MIPCH	TFPCH
Interest rate on investments	RSINT	MIINT	RSINT	MIINT	TFINT

where all files have the extension ".DAT".

The first four elements of the vectors ANNINT and TOTINV are initialized with actual values for the years 1966-1969. See section B for the description of these variables.

The user is reminded that before he can run the FUND.9 program, he must run the eight programs of chapters III - X, all for the same plan.

The last data source that must be read in is file OPSHN. This data contains the annual total contribution rate for each year 1966-2025.

D. METHODOLOGY

The first table generated by FUND.9 is a summary table of total benefits and expenses of administration for each year (1970-2025). Annual figures for each type of benefit are read in from input files. Expenses of administration, according to the Actuarial Report (1969), are defined to be one-tenth of one per cent of contributory earnings for each year. Contributory earnings are calculated by dividing total contributions by the contribution rate.

The second table generated by FUND.9 contains three figures for each year (1970-2025), namely, total contributions, total benefits and expenses of administration, and the value of the fund. The most important calculation in this section is the computation of the value of the fund.

The value of the fund in any given year is calculated as follows. First, the value of interest earned since the preceding year on outstanding investments is calculated. Next, the total amount available for investment in that year is computed. It is equal to the sum of:

1) total contributions
2) maturing loans

3) interest earned in the preceding year on outstanding investments

4) less total benefits and expenses of administration.

The program assumes that loans mature after twenty years.

If the total amount available for investment is negative, it may be necessary to recall certain loans (see section E) in order to prevent the fund from going bankrupt.

The remaining steps in the calculation of the value of the fund require the definition of the following program variables:

TOT6 - is the cumulative total value of loans that have been paid back. This variable has a different value for every year after the first loan has been repaid.

TOT7 - is the cumulative total value of investments that have been made. This variable has a different value for every year (1970-2025).

COL12 - is the total value of outstanding investments (i.e. TOT7 - TOT6). This variable has a different value for every year.

COL13 - is equal to COL12 plus interest earned in the first quarter of the next year on outstanding investments. This variable has a different value for every year and allows for the three-month time lag on investment interest.

COL14 - is the difference between contributions and total expenses (i.e. benefits and expenses of administration) in 1969 multiplied by a factor equivalent to the interest rate for 1969 raised to the power (YEAR - 1969) where YEAR ranges from 1970 to 2025. This variable has a different value for every year.

COL15 - is one-eighth of the following quantity: COL14 less the difference between contributions and total expenses in the current year. This variable has a different value for every year.

FUND - is the sum of COL13 and COL15. This variable has a different value for every year.

The third table generated by FUND.9 is a summary table designed to show the behaviour of the fund in more detail. The figures appearing in this table were calculated in the earlier steps of the program. "Total Revenue" is simply the sum of "Contributions", "Interest", and "Loan Repayments". "Net Revenue"

is equal to "Total Revenue" less "Benefits and Expenses". Note that "Net Revenue" is the same as the total amount available for investment.

E. POLICY VARIABLE INPUT

Most of the information which the user must provide via the teletype when executing FUND.9 is, in fact, for information purposes only. It is used to print a summary page describing in detail the plan being tested.

It is possible that under certain plans the Canada Pension Plan will become exhausted at some future point in time. In order to help prevent this, the Canada Pension Plan empowers the Minister of Finance to recall loans. In FUND.9, the user has the option of

i) calling back the most recently made loans, or

ii) calling back no loans at all, or

iii) calling back the loans with the shortest time to maturity.

The method used by the Department of Insurance was the first of the above. Once the loan has been recalled, interest is no longer payable. The program assumes that the full loan made in any year will be recalled and will not redeem only a partial issue. Thus any excess recalled and not needed to cover expenses will be loaned out again as a new investment.

Should the user indicate that he is executing the program for Ontario only, the fund data for 1966-1969 is taken as 55 per cent of the total for those years. Similar ratios could be used for the other provinces.

F. OUTPUT FILES

Each run of this program produces one output file. The name of the output file depends on the plan being tested.

RSCUR	-	RSCFD
MICUR	-	MICFD
RSPRO	-	RSPFD
MIPRO	-	MIPFD
TXFPB	-	TFPFD

In addition, when the run is complete, a message will be printed on the terminal giving the "END OF RUN" statement, the CPU time required for the run, and the name of the output file.

G. TELETYPE QUESTIONS

1) TYPE IN PLAN TO BE TESTED

The user types in one of the appropriate 5-digit codes. Should the user type in some other combination, an error message will come up and the user can retype the correct version.

1a) IS TXFPB PLAN MODERATE INFLATION? (Y OR N)
(DEFAULT IS REASONABLE STABILITY) ---

This question will only be typed for the TXFPB options and the user's response will generate the proper set of economic assumptions for the interest rate of the fund.

2) TYPE IN POPULATION SEGMENT USING THESE CODES:

1 - NFLD; 2 - PEI; 3 - NS; 4 - NB; 5 - QUE; 6 - ONT;
7 - MAN; 8 - SASK; 9 - ALTA; 10 - BC; 11 - CANADA;
12 - CANADA LESS QUE (DEFAULT IS 12) ---

Self-explanatory.

3) IF EXPENSES EXCEED REVENUE, WHICH LOANS WILL BE RECALLED?
(TYPE -1 FOR MOST RECENT; 0 FOR NONE; 1 FOR EARLIEST):

The user can specify here the recall provisions to be used.

4) TYPE IN YEAR'S BASIC EXEMPTION -

The user can specify the YBE to be used. The standard response is 600.

5) RETIREMENT BENEFITS
TYPE IN RETIREMENT BENEFIT RATIO AND PERCENTAGE OF LOWEST AER'S TO DROP OUT ---

The user will specify which retirement ratio and drop out ratio were used in the PENSIM run and this information will appear on the summary page of the output file.

6) IS THERE AN EARNINGS TEST (Y OR N) -

The user responds with the appropriate letter depending on which assumptions were used.

7) DISABILITY BENEFITS
TYPE IN ANNUAL FLAT RATE (IN DOLLARS) AND YEAR IT BEGINS -

The user types in the value that was used in DISBN.7 and the year in which the changes were made.

8) TYPE IN PERCENTAGE OF BENEFIT THAT IS EARNINGS RELATED AND YEAR IT BEGINS -

The user types in the value that was used in DISBN.7 and the year in which the changes were made.

9) CHILDREN'S BENEFITS
TYPE IN ANNUAL FLAT RATE (IN DOLLARS) AND YEAR IT BEGINS -

The user types in the value that was used in CHILD.8 and the year any change was made. If no changes were made, the initial amount is 300 in 1967.

10) WIVES' BENEFITS
TYPE IN ANNUAL FLAT RATE (IN DOLLARS) AND YEAR IT BEGINS -

The user will type in the amount to be paid to the wife of a disabled pensioner if any, and the year in which such payments will begin.

11) WIDOWS' BENEFITS
TYPE IN ANNUAL FLAT RATE (IN DOLLARS) AND YEAR IT BEGINS -

The user types in the values used in WIDOW.6 and the year in which any changes take place.

12) TYPE IN PERCENTAGE OF BENEFIT THAT IS EARNINGS RELATED AND YEAR IT BEGINS ---

The user types in the values used in WIDOW.6 and the year in which any changes take place.

13) ORPHANS' BENEFITS
TYPE IN ANNUAL FLAT RATE (IN DOLLARS) AND YEAR IT BEGINS

The user types in the value that was used in CHILD.8 and the year any change was made. If no changes were made, the initial amount is 300 in 1967.

XII CPPBN.10

A. INTRODUCTION

CPPBN.10 is the tenth and final program in the PENSIM model. This program projects maximum monthly benefits under the Canada Pension Plan for each type of pension. In addition, maximum monthly OAS and GIS payments are projected for single pensioners so that comparisons can easily be made.

The projections are made for each year from 1973 to 2025 and the amounts will vary given the alternatives under consideration. Thus, for any set of policy variables being tested actuarially, PENSIM can also generate the levels of benefits actually payable to recipients on an individual basis. Thus, the macroscopic view of the CPP fund can be shown together with the microscopic benefit levels.

B. VECTORS AND MATRICES

YMPE - this vector contains the YMPE values for 1966-2025 and they are read in from the disk depending on which plan is being tested.

RETBN - this vector contains the maximum retirement benefits available in each year and is calculated in the program.

WIDOW - this vector contains the maximum widow's benefit available in each year and is calculated in the program by summing WIDFLT and WIDERN.

WIDFLT - this vector contains the widow's flat rate benefit for each year 1973-2025.

WIDERN - this vector contains the widow's earnings-related benefit in each year and is calculated as a percentage of the imputed retirement pension.

LMPSM - this vector contains the lump sum death benefit in any year and is set at 10 per cent of the YMPE for each year.

DISABL - this vector contains the maximum disability benefit for each year and is the sum of DISFLT and DISERN.

DISFLT - contains the flat rate benefit for disability for each year 1973-2025.

DISERN - contains the disability earnings-related benefit in each year and is calculated as a percentage of the imputed retirement pension.

DISWIF - this vector contains the monthly benefit payable to a wife of a disabled pensioner for each year 1973-2025.

CHLDBN - contains the monthly benefit paid to orphans and children of the disabled.

OAS - this vector contains the maximum monthly OAS payment to anyone aged 65+ for every year 1973-2025.

GIS - this vector contains the maximum monthly GIS payment to a single pensioner for every year 1973-2025.

CPI - this vector contains the two sets of CPI growth assumptions for calculating the OAS and GIS benefits.

MATUR - this vector contains the factors used to show the maturing aspects of the plan and is found in a data statement.

C. INPUT FILES AND DATA STATEMENTS

The YMPE values are read in from the appropriate data file depending on the plan being tested. The vector MATUR is input through a data statement to allow for the maturing aspects of the Canada Pension Plan.

Similarly, the vector CPI is read in from a data statement and this contains the annual increases in the consumer price index for each year to 2025, first for the moderate inflation assumptions and then for the reasonable stability assumptions.

D. METHODOLOGY

When execution of the program begins, the user is asked several questions (see section G) that specify the plan, the pension rates and monthly amounts. Once this information is provided, the program projects the benefit levels by type for each year to 2025.

The first calculation is that of the retirement pension. This calculation multiplies the retirement pension rate by the average earnings ratio and then by the three-year moving average of YMPE's up to the year of retirement. This formula accounts for the maturing aspects of the Plan and calculates the monthly benefit.

Once the retirement pension has been calculated, the program uses the widow's ratio to calculate the widow's earnings-related portion and similarly for the disability earnings-related portion. The lump sum death benefit is calculated at this point as 10 per cent of the year's YMPE.

The next step is the calculation of the flat rate benefits. This process begins with the 1973 monthly flat rate benefits as specified by the user and escalates the amount annually by a pension index which is also input by the user.

The flat rate benefits calculated are the widow's and disability flat rates, the benefits to orphans and children of the disabled, and the payment to the wife of a disabled pensioner, if this is applicable.

Once these calculations have been done, the earnings-related and flat rate portions of supplementary benefits are added to get the total maximum widow's and disability pension.

The final calculation is the OAS-GIS pension which begins with the 1972 maximum monthly amounts for single pensioners, and escalates these benefits annually by the increase in the consumer price index given the economic assumptions being tested.

The program then writes out the annual benefit levels by type on disk file BENFT.

E. POLICY VARIABLE INPUT

The user must specify at the start of execution the plan he is using, the average earnings rates to be used and the ceiling on the pension index which is to be applied to the flat rate benefits.

Similarly, the user must input to the program the widow and disability earnings-related ratios and the monthly flat rate amounts to be used in 1973. It is at this point that the user can specify the benefit, if any, to the wife of a disabled pensioner.

F. OUTPUT FILES

The output from program CPPBN.10 is in file BENFT. This data requires a full 132 width printer because of the number of benefits that are being calculated.

G. TELETYPE QUESTIONS

1) TYPE IN PLAN TO BE TESTED:

   The user will respond with one of the five possibilities listed in chapter V.

This response automatically inputs the proper data source of YMPE values for calculating the retirement benefit and it selects the proper set of economic assumptions.

2) TYPE IN PENSIONER'S LIFETIME AVERAGE EARNINGS RATIO (0 - 1):

   Respond with a decimal value in the proper range.

3) TYPE IN CEILING ON PENSION INDEX in 1973 ET SEQ:

   Respond with a value such as 1.02. This is the statutory limit of the current plan.

4) TYPE IN RETIREMENT RATE (0 - 1):

   Respond with a decimal value in the proper range. The statutory value is .25.

5) TYPE IN WIDOW'S MONTHLY FLAT RATE IN 1973:

   Respond with a monthly dollar value. For example, the current plan amount is 28.15 and the proposed value is 80.

6) TYPE IN WIDOW'S EARNINGS-RELATED RATIO (0 - 1):

Respond with a decimal value in the proper range. Currently the rate is .375 and the proposed rate is .75.

7) TYPE IN ORPHAN'S MONTHLY FLAT RATE IN 1973:

Respond with a dollar value. The amount is currently 28.15.

8) TYPE IN DISABILITY MONTHLY FLAT RATE IN 1973:

Respond with a monthly dollar value. For example, the current plan is 28.15 and the proposed amount is 80.

9) TYPE IN DISABILITY EARNINGS-RELATED RATIO IN 1973 (0 - 1):

Respond with a decimal value in the proper range. Currently, the rate is .75 and the proposed rate is 1.0.

XIII DATA SOURCES

The tables in this chapter were used in the PENSIM model and encompass most of the actuarial assumptions incorporated in the programs.

In all cases, the source of the data was with the federal Department of Insurance. This allowed compatability of methodology and assured a common basis for comparisons. While some of the data used was published in the Actuarial Report, a significant amount of information was taken directly from Department of Insurance worksheets.

Where necessary, original data was used as the basis for interpolation and is so identified on the appropriate table. Each table is identified as to the nature of the data it contains, the vector/array or input file name and the program (s) in which the data is used.

I POPULATION - CANADA LESS QUEBEC, MALES - PRJM1, PRJM - POP.1

All Figures in Thousands

AGE/YEAR	1966	1970	1975	1980
0 - 4	803.1	658.3	644.4	753.9
5 - 9	825.3	836.5	672.5	660.0
10 - 14	749.5	833.4	857.6	696.0
15 - 19	644.9	734.9	852.7	879.3
20 - 24	492.9	632.0	749.3	868.7
25 - 29	430.6	487.8	646.4	765.0
30 - 34	444.1	447.6	505.4	665.0
35 - 39	463.1	458.5	466.1	525.2
40 - 44	449.1	473.9	468.2	477.3
45 - 49	395.4	437.9	471.2	466.5
50 - 54	365.5	378.0	428.3	461.7
55 - 59	303.9	339.4	362.0	410.7
60 - 64	245.6	274.3	315.9	338.5
65 - 69	192.2	213.7	243.7	281.9
70 - 74	152.7	153.4	173.9	199.5
75 - 79	110.2	110.9	111.8	127.9
80 - 84	65.3	68.6	68.8	69.7
85 - 89	27.0	30.7	32.5	32.6
90 and over	8.3	9.7	11.1	11.8

The data files PRJM1 and PRJF1 are the 1966 columns in the male and female population data respectively. PRJM and PRJF contain the remaining population statistics.

continued ...

I POPULATION - CANADA LESS QUEBEC, MALES - PRJM1, PRJM - POP.1

All Figures in Thousands

AGE/YEAR	1985	1990	1995	2000
0 - 4	843.2	875.7	870.0	875.7
5 - 9	771.5	861.8	895.8	891.9
10 - 14	686.1	799.5	891.9	928.3
15 - 19	720.1	712.3	827.5	922.1
20 - 24	896.7	740.2	734.4	850.9
25 - 29	885.3	915.7	762.0	758.3
30 - 34	784.6	906.9	939.3	788.7
35 - 39	686.3	806.5	930.0	964.5
40 - 44	536.7	698.2	818.2	942.1
45 - 49	476.5	535.2	695.5	814.1
50 - 54	457.8	468.4	525.6	682.6
55 - 59	443.5	441.0	451.7	507.2
60 - 64	384.7	416.2	415.3	425.9
65 - 69	302.9	344.8	373.5	373.3
70 - 74	232.3	251.0	286.6	311.2
75 - 79	148.1	173.3	188.0	215.3
80 - 84	80.1	92.9	109.1	118.4
85 - 89	33.0	38.0	44.1	51.8
90 and over	11.9	12.1	13.6	15.9

continued ...

I POPULATION - CANADA LESS QUEBEC, MALES - PRJM1, PRJM - POP. 1

All Figures in Thousands

AGE/YEAR	2005	2010	2015	2020	2025
0 - 4	917.4	975.8	1,027.1	1,064.6	1,098.4
5 - 9	898.9	941.8	1,001.3	1,054.0	1,093.0
10 - 14	926.2	935.0	979.8	1,041.1	1,095.9
15 - 19	960.1	959.6	970.3	1,016.9	1,080.1
20 - 24	946.3	985.6	986.8	999.0	1,047.2
25 - 29	875.5	971.9	1,012.6	1,015.4	1,029.3
30 - 34	786.7	904.8	1,002.4	1,044.6	1,049.4
35 - 39	816.8	816.6	935.6	1,034.3	1,078.3
40 - 44	977.3	832.4	833.4	952.5	1,051.5
45 - 49	936.3	971.4	829.4	831.0	948.6
50 - 54	798.3	917.5	952.0	814.2	816.1
55 - 59	658.0	768.8	883.0	916.3	785.0
60 - 64	478.3	618.5	721.8	828.2	859.5
65 - 69	383.5	430.3	555.4	647.4	742.4
70 - 74	311.3	319.9	358.9	463.2	539.9
75 - 79	234.0	234.1	240.5	269.9	348.4
80 - 84	135.9	147.7	147.7	151.7	170.3
85 - 89	56.2	64.5	70.2	70.1	72.0
90 and over	18.5	20.3	23.1	25.3	25.6

continued ....

I POPULATION - CANADA LESS QUEBEC, FEMALES - PRJF1, PRJF - POP.1

All Figures in Thousands

AGE/YEAR	1966	1970	1975	1980
0 - 4	761.8	626.3	613.5	717.8
5 - 9	792.7	793.6	639.3	628.3
10 - 14	715.8	799.7	813.6	661.3
15 - 19	626.5	702.8	820.9	836.3
20 - 24	494.3	625.2	723.3	842.8
25 - 29	430.5	491.7	645.9	745.6
30 - 34	425.4	446.9	512.3	668.2
35 - 39	446.8	439.0	465.8	532.5
40 - 44	453.3	464.0	450.0	478.2
45 - 49	396.3	443.9	464.8	451.9
50 - 54	355.2	384.2	441.1	462.6
55 - 59	292.0	336.0	379.4	435.4
60 - 64	242.7	275.3	325.9	368.4
65 - 69	205.7	221.8	258.2	306.2
70 - 74	174.8	181.5	197.3	230.6
75 - 79	126.0	137.7	148.7	160.6
80 - 84	77.3	86.7	96.8	105.0
85 - 89	35.4	40.7	47.2	53.2
90 and over	13.2	15.0	17.4	20.3

continued ...

I POPULATION - CANADA LESS QUEBEC, FEMALES-PRJF1, PRJF - POP.1

All Figures in Thousands

AGE/YEAR	1985	1990	1995	2000
0 - 4	802.3	833.0	825.0	832.4
5 - 9	733.6	819.2	851.2	845.0
10 - 14	652.8	759.9	847.5	881.8
15 - 19	686.9	680.6	789.7	879.5
20 - 24	860.8	713.9	709.7	821.0
25 - 29	867.5	887.4	743.0	741.0
30 - 34	769.6	893.1	915.1	773.6
35 - 39	689.9	792.7	917.7	941.9
40 - 44	545.7	703.1	806.5	932.2
45 - 49	480.1	548.2	704.3	807.4
50 - 54	450.2	478.8	546.3	701.2
55 - 59	457.1	445.9	474.2	541.1
60 - 64	423.3	444.7	434.9	463.0
65 - 69	347.1	399.3	419.8	411.1
70 - 74	273.7	310.7	358.1	376.8
75 - 79	189.1	225.1	255.9	295.1
80 - 84	113.7	134.3	160.2	182.2
85 - 89	58.1	63.2	74.9	89.4
90 and over	23.2	25.7	28.2	32.8

continued ...

I POPULATION - CANADA LESS QUEBEC, FEMALES - PRJF1, PRJF - POP.1

All Figures in Thousands

AGE/YEAR	2005	2010	2015	2020	2025
0 - 4	872.1	927.5	976.5	1,012.0	1,044.2
5 - 9	853.4	894.2	950.7	1,000.9	1,037.8
10 - 14	877.2	887.3	929.7	988.1	1,040.1
15 - 19	915.4	912.6	924.6	968.8	1,029.2
20 - 24	912.3	949.9	949.0	962.9	1,009.0
25 - 29	853.9	946.8	986.2	987.2	1,003.1
30 - 34	773.2	887.5	982.1	1,023.3	1,026.4
35 - 39	802.6	803.9	919.4	1,015.4	1,058.3
40 - 44	957.2	819.9	822.5	938.3	1,034.9
45 - 49	932.3	957.5	822.1	825.2	940.4
50 - 54	803.1	926.5	951.8	818.8	822.3
55 - 59	692.9	792.7	913.7	938.9	809.3
60 - 64	527.8	674.4	770.9	887.8	912.6
65 - 69	437.8	498.7	636.7	727.4	837.3
70 - 74	368.8	392.7	447.3	571.1	652.4
75 - 79	310.8	304.3	324.0	369.1	471.2
80 - 84	210.1	221.3	216.7	230.8	262.8
85 - 89	101.9	117.4	123.7	121.1	128.9
90 and over	39.2	45.1	51.8	55.5	55.2

II ADJUSTMENT FACTORS - ADJFC - MMAE.3

AGE GROUP	MALES	FEMALES
18 - 19	1.13591	1.04537
20 - 24	.97518	1.00941
25 - 29	.99412	1.04689
30 - 34	1.00023	1.03419
35 - 39	1.00247	1.01398
40 - 44	1.00067	1.00034
45 - 49	.99527	.99267
50 - 54	.98426	.98501
55 - 59	.96821	.97721
60 - 64	.95424	.97255
65 - 69	.93388	.98098

III DISABILITY DROP-OUT FACTORS - DSDRP - RETBN.4

AGE GROUP IN 1965	DEATH OR RETIREMENT AT AGE:			
	25	30	35*	40
-50 to -46	1.002	1.003	1.004	1.005
-45 to -41	1.002	1.003	1.004	1.005
-40 to -36	1.002	1.003	1.004	1.005
-35 to -31	1.002	1.003	1.004	1.005
-30 to -26	1.002	1.003	1.004	1.005
-25 to -21	1.002	1.003	1.004	1.005
-20 to -16	1.002	1.003	1.004	1.005
-15 to -11	1.002	1.003	1.004	1.005
-10 to -6	1.002	1.003	1.004	1.005
- 5 to -1	1.002	1.003	1.004	1.005
0 to 4	1.002	1.003	1.004	1.005
5 to 9	1.002	1.003	1.004	1.005
10 to 14	1.002	1.003	1.004	1.005
15 to 19	1.002	1.003	1.004	1.005
20 to 24	1.000	1.002	1.003	1.004
25 to 29	1.000	1.000	1.003	1.004
30 to 34	1.000	1.000	1.000	1.003
35 to 39	1.000	1.000	1.000	1.000
40 to 44	1.000	1.000	1.000	1.000
45 to 49	1.000	1.000	1.000	1.000
50 to 54	1.000	1.000	1.000	1.000
55 to 59	1.000	1.000	1.000	1.000
60 to 64	1.000	1.000	1.000	1.000
65 to 69	1.000	1.000	1.000	1.000

* Interpolated from adjoining columns

continued ...

III DISABILITY DROP-OUT FACTORS - DSDRP - RETBN.4

AGE GROUP IN 1965	DEATH OR RETIREMENT AT AGE:				
	45*	50	55*	60	65
-50 to -46	1.006	1.007	1.0085	1.010	1.015
-45 to -41	1.006	1.007	1.0085	1.010	1.015
-40 to -36	1.006	1.007	1.0085	1.010	1.015
-35 to -31	1.006	1.007	1.0085	1.010	1.015
-30 to -26	1.006	1.007	1.0085	1.010	1.015
-25 to -21	1.006	1.007	1.0085	1.010	1.015
-20 to -16	1.006	1.007	1.0085	1.010	1.015
-15 to -11	1.006	1.007	1.0085	1.010	1.015
-10 to -6	1.006	1.007	1.0085	1.010	1.015
-5 to -1	1.006	1.007	1.0085	1.010	1.015
0 to 4	1.006	1.007	1.0085	1.010	1.015
5 to 9	1.006	1.007	1.0085	1.010	1.015
10 to 14	1.006	1.007	1.0085	1.010	1.015
15 to 19	1.006	1.007	1.0085	1.010	1.015
20 to 24	1.0055	1.007	1.0085	1.010	1.015
25 to 29	1.0055	1.007	1.0085	1.010	1.015
30 to 34	1.0045	1.006	1.0085	1.011	1.015
35 to 39	1.003	1.006	1.0085	1.011	1.016
40 to 44	1.000	1.004	1.0075	1.011	1.017
45 to 49	1.000	1.000	1.0050	1.010	1.017
50 to 54	1.000	1.000	1.0000	1.007	1.012
55 to 59	1.000	1.000	1.0000	1.000	1.012
60 to 64	1.000	1.000	1.0000	1.000	1.012
65 to 69	1.000	1.000	1.0000	1.000	1.000

* Interpolated from adjoining columns

IV SHORT RANGE RETIREMENT BENEFIT FACTORS - RFAC - RETBN.4

YEAR	DEATH AT AGE 60		DEATH AT AGE 65	
	Males	Females	Males	Females
1970	61	21	167	31
1971	71	12	148	55
1972	86	30	232	45
1973	114	20	189	73
1974	115	42	309	61

V DEATH BENEFIT COST REDUCTION FACTORS - RSDRD - RETBN.4

(REASONABLE STABILITY)

YEAR*	
1970	.098
1975	.082
1980	.070
1990	.055
2000	.048
2001+	.045

* Values for intermediate years are interpolated linearly

VI DEATH BENEFIT COST REDUCTION FACTORS - MIDRD - RETBN.4

(MODERATE INFLATION)

YEAR*	
1970	.098
1975	.082
1980	.073
1990	.059
2000	.052
2001+	.052

* Values for intermediate years are interpolated linearly

VII ONE YEAR SURVIVAL PROBABILITIES - SURVM - RETBN.4; WIDOW.6

AGE GROUP	1966 - 1969		1970 - 1974		1975 - 1979	
	M	F	M	F	M	F
20 - 24	.9984	.9995	.9984	.9995	.9985	.9995
25 - 29	.9985	.9993	.9985	.9993	.9986	.9994
30 - 34	.9984	.9991	.9984	.9991	.9985	.9991
35 - 39	.9979	.9987	.9979	.9987	.9980	.9987
40 - 44	.9970	.9981	.9970	.9981	.9971	.9981
45 - 49	.9942	.9969	.9943	.9970	.9945	.9971
50 - 54	.9906	.9951	.9907	.9952	.9912	.9954
55 - 59	.9848	.9928	.9850	.9930	.9856	.9932
60 - 64	.9768	.9881	.9770	.9883	.9778	.9889
65 - 69	.9648	.9805	.9650	.9809	.9658	.9816
70 - 74	.9475	.9673	.9479	.9676	.9490	.9680
75 - 79	.9219	.9437	.9223	.9443	.9239	.9455
80 - 84	.8813	.9059	.8815	.9067	.8825	.9079
85 - 89	.8232	.8484	.8232	.8490	.8231	.8502
90 +	.7274	.7486	.7272	.7482	.7267	.7477

continued ...

VII ONE YEAR SURVIVAL PROBABILITIES - SURVM - RETBN.4; WIDOW.6

AGE GROUP	1980 - 1984		1985 - 1989		1990 - 1994	
	M	F	M	F	M	F
20 - 24	.9986	.9996	.9987	.9996	.9987	.9996
25 - 29	.9986	.9994	.9987	.9994	.9987	.9995
30 - 34	.9985	.9992	.9986	.9992	.9986	.9992
35 - 39	.9980	.9988	.9981	.9988	.9981	.9988
40 - 44	.9972	.9982	.9972	.9982	.9973	.9982
45 - 49	.9948	.9972	.9951	.9973	.9953	.9973
50 - 54	.9917	.9956	.9921	.9958	.9924	.9959
55 - 59	.9863	.9935	.9870	.9937	.9875	.9938
60 - 64	.9786	.9893	.9794	.9896	.9801	.9898
65 - 69	.9669	.9821	.9682	.9824	.9693	.9827
70 - 74	.9503	.9686	.9517	.9693	.9530	.9698
75 - 79	.9251	.9464	.9261	.9471	.9268	.9475
80 - 84	.8834	.9089	.8841	.9097	.8846	.9103
85 - 89	.8230	.8514	.8229	.8525	.8228	.8531
90 +	.7260	.7472	.7253	.7467	.7247	.7463

AGE GROUP	1995 - 1999		2000 - 2025	
	M	F	M	F
20 - 24	.9988	.9996	.9988	.9996
25 - 29	.9988	.9995	.9988	.9995
30 - 34	.9987	.9992	.9987	.9992
35 - 39	.9982	.9988	.9982	.9988
40 - 44	.9973	.9983	.9974	.9983
45 - 49	.9955	.9974	.9956	.9974
50 - 54	.9926	.9960	.9927	.9961
55 - 59	.9878	.9939	.9879	.9940
60 - 64	.9805	.9900	.9807	.9901
65 - 69	.9700	.9829	.9703	.9830
70 - 74	.9538	.9702	.9542	.9704
75 - 79	.9273	.9477	.9276	.9478
80 - 84	.8848	.9107	.8850	.9109
85 - 89	.8227	.8538	.8227	.8540
90 +	.7243	.7461	.7241	.7460

VIII EARNINGS TEST ADJUSTMENT FACTORS - ETADJ - CONT.5

YEAR	MALES AND FEMALES
1973	.933
1974	.867
1975	.800
1976	.680
1977	.560
1978	.440
1979	.320
1980+	.200

IX LABOUR FORCE PARTICIPATION RATES - PART - RETBN.4, CONT.5

AGE GROUP	MALES 1966 - 1984	MALES 1985+
18-19	.65	.68
20-24	1.00	1.00
25-34	1.00	1.00
35-49	.93	.94
50-59	.87	.88
60-64	.78	.79
65-69	.53	.54

FEMALES
(Moderate Inflation)

AGE GROUP	1966 - 1974	1975 - 1984	1985 - 2004	2005+
18-19	.46	.50	.55	.58
20-24	.66	.69	.73	.75
25-29	.44	.50	.57	.58
30-59	.36	.42	.48	.49
60-64	.25	.29	.34	.35
65-69	.13	.13	.14	.14

FEMALES
(Reasonable Stability)

AGE GROUP	1966 - 1974	1975 - 1984	1985 - 2004	2005+
18-19	.46	.49	.53	.55
20-24	.66	.68	.71	.73
25-29	.44	.50	.56	.57
30-59	.36	.41	.47	.48
60-64	.25	.29	.33	.34
65-69	.13	.13	.14	.14

X OVERPAYMENT ADJUSTMENT FACTORS - ADJ - CONT.5

YEAR	MALES AND FEMALES
1966-1970	.100
1971	.096
1972	.092
1973	.083
1974	.074
1975	.065
1976	.056
1977	.052
1978	.048
1979	.044
1980-2025	.040

[illegible] PROJECTED SURVIVAL RATIOS FOR QUINQUENNIAL AGE GROUPS - SURVF - [illegible]

YEAR	SURVIVAL AGE GROUPS 17-21* to 22-26	22-26 to 27-31	27-31 to 32-36	32-36 to 37-41
1968-70	.999	.999	.998	.998
1970-75	.997	.997	.995	.993
1975-80	.997	.997	.996	.994
1980-85	.998	.998	.996	.994
1985-90	.998	.998	.996	.994
1990-95	.998	.998	.996	.994
1995-2000	.998	.998	.996	.994

YEAR	SURVIVAL AGE GROUPS 15-19 to 20-24	20-24 to 25-29	25-29 to 30-34	30-34 to 35-39
1965-70	.997	.997	.996	.994
1970-75	.997	.997	.996	.994
1975-80	.997	.997	.997	.994
1980-85	.998	.998	.997	.995
1985-90	.998	.998	.997	.995
1990-95	.998	.998	.997	.995
1995-2000	.998	.998	.997	.995

* These Age Groups differ slightly for 1968-70

continued ....

XI PROJECTED SURVIVAL RATIOS FOR QUINQUENNIAL AGE GROUPS - SURVP - WIDOW.6

YEAR	SURVIVAL AGE GROUPS 37-41 to 42-46	42-46 to 47-51	47-51 to 52-56	52-56 to 57-61
1968-70	.997	.996	.992	.989
1970-75	.990	.986	.979	.968
1975-80	.991	.987	.980	.969
1980-85	.991	.987	.980	.969
1985-90	.992	.988	.981	.970
1990-95	.992	.988	.981	.971
1995-2000	.992	.988	.982	.972

YEAR	SURVIVAL AGE GROUPS 35-39 to 40-44	40-44 to 45-49	45-49 to 50-54	50-54 to 55-59
1965-70	.992	.989	.981	.973
1970-75	.992	.988	.982	.974
1975-80	.993	.989	.983	.975
1980-85	.993	.989	.983	.975
1985-90	.993	.990	.984	.976
1990-95	.993	.990	.984	.976
1995-2000	.993	.990	.985	.977

continued ....

XI PROJECTED SURVIVAL RATIOS FOR [illegible] AGE GROUPS - [illegible] - WIDOW.6

	SURVIVAL AGE GROUPS			
YEAR	57-61 to 62-66	62-66 to 67-71	67-71 to 72-76	72-76 to 77-81
1968-70	.982	.971	.952	.920
1970-75	.947	.915	.860	.771
1975-80	.949	.917	.863	.774
1980-85	.951	.919	.864	.776
1985-90	.952	.920	.866	.777
1990-95	.953	.922	.867	.779
1995-2000	.954	.922	.868	.779

	SURVIVAL AGE GROUPS			
YEAR	55-59 to 60-64	60-64 to 65-69	65-69 to 70-74	70-74 to 75-79
1965-70	.956	.928	.885	.812
1970-75	.958	.931	.890	.816
1975-80	.960	.933	.893	.818
1980-85	.961	.936	.894	.820
1985-90	.962	.937	.895	.822
1990-95	.963	.938	.897	.823
1995-2000	.964	.939	.897	.824

continued ...

XI PROJECTED SURVIVAL RATIOS FOR QUINQUENNIAL AGE GROUPS - SURVP - WIDOW.6

YEAR	SURVIVAL AGE GROUPS 77-81 to 82-86	82-86 to 87-91	87-91 to 92-96	92+ to 97+
1968-70	.866	.782	.668	.503
1970-75	.641	.475	.000	.000
1975-80	.645	.478	.000	.000
1980-85	.647	.480	.299	.000
1985-90	.648	.482	.299	.132
1990-95	.650	.483	.299	.132
1995-2000	.650	.484	.299	.132

YEAR	SURVIVAL AGE GROUPS 75-79 to 80-84	80-84 to 85-89	85-89 to 90-94	90+ to 95+
1965-70	.698	.541	.365	.179
1970-75	.704	.547	.367	.177
1975-80	.707	.551	.368	.176
1980-85	.709	.554	.369	.176
1985-90	.710	.556	.371	.177
1990-95	.712	.557	.372	.177
1995-2000	.712	.558	.373	.177

XII PERCENTAGE OF WIDOW BENEFICIARIES NOT IN RECEIPT OF AGE RETIREMENT PENSIONS

BASED ON AGE IN 1968 - PWNRP1 - WIDOW.6

AGE GROUP	PERCENTAGE
Less than 20	55
20 - 24	83
25 - 29	78
30 - 34	73
35 - 39	67
40 - 44	61
45 - 49	54
50 - 54	47
55 - 59	40
60 - 64	32
65 - 69	15

BASED ON AGE IN 1965 - PWNRP2 - WIDOW.6

AGE GROUP	PERCENTAGE
Less than 20	85
20 - 24	50
25 - 29	75
30 - 34	69
35 - 39	63
40 - 44	57
45 - 49	50
50 - 54	43
55 - 59	36
60 - 64	25
65 - 69	11

XIII AGE DISTRIBUTION OF WIVES - AGEDIS - WIDOW.6

HUSBAND'S AGE GROUP	WIFE'S AGE GROUP	% DIST. OF WIVES	HUSBAND'S AGE GROUP	WIFE'S AGE GROUP	% DIST. OF WIVES
20 - 24	- 20	22	50 - 54	30 - 34	2
	20 - 24	69		35 - 39	5
	25 - 29	9		40 - 44	17
	30 - 34	0		45 - 49	38
	35 - 39	0		50 - 54	32
	40 - 44	0		55 - 59	6
25 - 29	- 20	3	55 - 59	35 - 39	3
	20 - 24	40		40 - 44	6
	25 - 29	49		45 - 49	18
	30 - 34	8		50 - 54	37
	35 - 39	0		55 - 59	30
	40 - 44	0		60 - 64	6
30 - 34	- 20	0	60 - 64	40 - 44	3
	20 - 24	9		45 - 49	7
	25 - 29	39		50 - 54	19
	30 - 34	43		55 - 59	35
	35 - 39	9		60 - 64	29
	40 - 44	0		65 - 69	7
35 - 39	20 - 24	2	65 - 69	45 - 49	5
	25 - 29	10		50 - 54	7
	30 - 34	38		55 - 59	19
	35 - 39	42		60 - 64	34
	40 - 44	8		65 - 69	28
	45 - 49	0		70 - 74	7
40 - 44	25 - 29	3	70 - 74	50 - 54	6
	30 - 34	13		55 - 59	7
	35 - 39	40		60 - 64	20
	40 - 44	36		65 - 69	34
	45 - 49	8		70 - 74	27
	50 - 54	0		75 - 79	6
45 - 49	25 - 29	1			
	30 - 34	4			
	35 - 39	16			
	40 - 44	38			
	45 - 49	34			
	50 - 54	7			

continued ...

XIII AGE DISTRIBUTION OF WIVES - AGEDIS - WIDOW.6

HUSBAND'S AGE GROUP	WIFE'S AGE GROUP	% DIST. OF WIVES
75 - 79	55 - 59	7
	60 - 64	7
	65 - 69	21
	70 - 74	35
	75 - 79	25
	80 - 84	5
80 - 84	60 - 64	8
	65 - 69	8
	70 - 74	23
	75 - 79	36
	80 - 84	22
	85 - 89	3
85 - 89	65 - 69	10
	70 - 74	10
	75 - 79	26
	80 - 84	35
	85 - 89	17
	90 -	2
90 +	70 - 74	13
	75 - 79	13
	80 - 84	30
	85 - 89	32
	90 -	12

XIV PROPORTIONS MARRIED - PRPMRD - WIDOW.6

HUSBAND'S AGE GROUP	1968 1970	1975 1980	1990	2000	AFTER 2000
20 - 24	30	30	30	30	30
25 - 29	70	70	70	70	70
30 - 34	82	82	82	82	82
35 - 39	86	86	86	86	86
40 - 44	88	88	88	88	88
45 - 49	88	88	88	88	89
50 - 54	87	87	88	88	88
55 - 59	84	85	85	86	86
60 - 64	82	83	84	85	85
65 - 69	80	81	82	83	84
70 - 74	74	76	78	80	81
75 - 79	67	70	72	74	76
80 - 84	55	58	60	62	64
85 - 90	43	46	48	50	52
90 +	31	34	36	38	40

XV PROBABILITIES FOR RE-MARRIAGE OF WIDOWS - REMAR - WIDOW.6

For years of widowhood 1968-69

	Under 20	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
1968	.688	.789	.869	.923	.957	.975	.986	.993	.997	.998
1970	.270	.430	.613	.765	.864	.924	.961	.981	.992	1.0
1975	.541	.676	.795	.880	.934	.967	.984	.993	1.0	1.0
1980	.761	.838	.902	.943	.970	.986	.994	1.0	1.0	1.0
1985	.841	.903	.945	.970	.986	.994	1.0	1.0	1.0	1.0

For years of widowhood after 1970

	Under 20	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
1970	.288	.451	.627	.773	.868	.924	.960	.980	.991	.996
1975	.417	.569	.723	.837	.908	.952	.975	.989	.997	1.0
1980	.700	.794	.872	.924	.960	.981	.992	.997	1.0	1.0
1985	.813	.880	.931	.961	.981	.992	.997	1.0	1.0	1.0
1990	.880	.931	.961	.981	.992	.997	1.0	1.0	1.0	1.0

XVI PERCENTAGE OF WIDOWS ENTITLED TO WIDOW BENEFITS - PWEWB - WIDOW.6

YEAR OF WIDOWHOOD	UNDER 50	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90+
1968	90	85	75	70	60	55	0	0	0	0
1970	95	90	80	60	45	30	20	0	0	0
1975	95	90	85	75	60	45	30	20	0	0
1980	95	95	90	85	75	60	45	30	20	0
1990	95	95	95	90	85	80	75	60	45	30
2000	95	95	95	95	95	90	85	80	75	60
2015	95	95	95	95	95	95	90	90	85	80
2030	95	95	95	95	95	95	95	95	90	90

Annual values for this variable were obtained by linear interpolation.

XVII UNESCALATED FEMALE DEATH BENEFIT FACTORS - FFAC - WIDOW.6

1968 - 72	0
1973	23
1974	32
1975	41
1976	64
1977	88
1978	111
1979	135
1980	158
1981	181
1982	204
1983	228
1984	251
1985 - 2025	dependent upon plan being tested

XVIII UNESCALATED MALE DEATH BENEFIT FACTORS IN 1968 - FAC68 - WIDOW.6

AGE GROUP OF HUSBAND	
20 - 24	600
25 - 29	793
30 - 34	881
35 - 39	864
40 - 44	855
45 - 49	855
50 - 54	832
55 - 59	785
60 - 64	699
65 - 69	405

XIX FLAT RATE PREVALENCE RATES - PRVRTE - DISBN.7

AGE/YEAR	1975	1980	1985	1990	1995	2000+
22-24	0.04	0.05	0.05	0.05	0.05	0.05
25-29	0.10	0.13	0.13	0.13	0.13	0.13
30-34	0.24	0.35	0.37	0.36	0.36	0.37
35-39	0.40	0.60	0.67	0.69	0.68	0.68
40-44	0.66	0.96	1.07	1.12	1.13	1.12
45-49	0.96	1.39	1.55	1.63	1.67	1.68
50-54	1.78	2.61	2.93	3.07	3.15	3.16
55-59	2.88	4.27	4.78	4.97	5.08	5.12
60-64	5.00	7.64	8.66	9.01	9.21	9.31

XX EARNINGS RELATED PREVALENCE RATES - PRVRTE - DISBN.7

AGE/YEAR	1975	1980	1985	1990	1995	2000+
22-24	0.05	0.05	0.05	0.05	0.05	0.05
25-29	0.12	0.14	0.14	0.14	0.14	0.14
30-34	0.30	0.36	0.38	0.38	0.38	0.38
35-39	0.50	0.62	0.68	0.70	0.70	0.70
40-44	0.82	1.00	1.08	1.13	1.15	1.15
45-49	1.17	1.45	1.57	1.64	1.67	1.69
50-54	2.19	2.73	2.96	3.08	3.15	3.18
55-59	3.54	4.46	4.82	4.98	5.08	5.13
60-64	6.14	8.09	8.74	9.02	9.21	9.30

XXI NUMBER OF FEMALES PER 1000 MARRIED TO HUSBANDS OVER 65 WHO WERE DISABLED AT 65 AND CONTINUE TO MEET THE DISABILITY TEST - FMTH65 - DISBN.7

AGE/YEAR	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020+
45-49	0.490	0.731	.963	1.040	1.087	1.109	1.120	1.120	1.120	1.120
50-54	1.365	2.421	3.257	3.655	3.844	3.942	3.991	4.000	4.000	4.000
55-59	3.605	6.532	9.124	10.393	11.064	11.387	11.552	11.593	11.600	11.600
60-64	7.350	14.112	19.846	23.189	24.881	25.790	26.223	26.360	26.392	26.400

XXII PROPORTION INSURED FOR DISABILITY - PROP - DISBN.7

AGE/YEAR	MALES 1970 - 1985	MALES 1990+
22-24	.40	.40
25-39	.95	.95
40-54	.90	.91
55-64	.85	.86

continued ...

XXII PROPORTION INSURED FOR DISABILITY - PROP - DISBN.7

FEMALES (Moderate Inflation)

AGE/YEAR	1970 - 1975	1980 - 1985	1990 - 2005	2010+
22-24	.20	.21	.23	.24
25-29	.45	.52	.60	.61
30-34	.40	.47	.54	.55
35-59	.35	.42	.49	.50
60-64	.30	.36	.43	.44

FEMALES (Reasonable Stability)

AGE/YEAR	1970 - 1975	1980 - 1985	1990 - 2005	2010+
22-24	.20	.21	.22	.23
25-29	.45	.52	.59	.60
30-34	.40	.47	.53	.54
35-59	.35	.41	.48	.49
60-64	.30	.36	.42	.43

XXIII PROPORTION OF HUSBAND AND WIVES AT HOME WITH CHILDREN - PHWHWC - DISBN.7

AGE GROUP	
under 25	.576
25-29	.738
30-34	.942
35-39	.947
40-44	.894
45-49	.843
50-54	.741
55-59	.558
60-64	.356
65 +	.114

XXIV PROPORTION OF HUSBANDS TO TOTAL POPULATION - FACTOR - DISBN.7

AGE GROUP	
22-24	.576
25-29	.738
30-34	.942
35-39	.947
40-44	.894
45-49	.843
50-54	.741
55-59	.558
60-64	.356
65 +	.114

XXV PROPORTION OF CONTRIBUTIONS MADE BY PERSONS INSURED FOR DISABILITY - DISINS - DISBN.7

MALES	FEMALES		
1970 - 2025	1970 - 1975	1980 - 1985	1990+
.95	.70	.75	.80

XXVI PROBABILITIES OF BEING AN ORPHAN - PROB - CHILD.8

YEAR	AGE GROUP			
	0 - 4	5 - 9	10 - 14	15 - 17
1968	.105	.155	.234	.324
1970	.425	.670	.984	1.383
1975	.528	1.710	2.589	3.577
1980	.517	1.773	3.563	4.947
1985	.486	1.711	3.571	5.717
1990	.468	1.648	3.427	5.522
1995	.437	1.574	3.296	5.297
2000	.423	1.502	3.156	5.097
2005	.403	1.424	3.023	4.878
2010	.400	1.380	2.888	4.672
2015	.399	1.378	2.796	4.466
2020	.395	1.376	2.805	4.376
2025	.401	1.382	2.801	4.367

XXVII SURVIVING DISABLED FATHERS INSURED FOR DISABILITY - SDFIFD - CHILD.8

YEAR	AGE GROUP			
	0 - 4	5 - 9	10 - 14	15 - 17
1975	.399	.655	.986	1.301
1980	.488	.811	1.232	1.636
1985	.525	.877	1.338	1.778
1990	.541	.909	1.392	1.853
1995	.546	.923	1.420	1.895
2000+	.548	.929	1.432	1.916

XIV SAMPLE OUTPUT DATA

As described in chapter XI, PENSIM projects the fund levels for each year to 2025. Because of some slight differences in contribution and benefit results, described in chapters VI - X, the fund projections do not exactly duplicate the federal estimates.

The data shown in this chapter is the output for the Canada Pension Plan operating under the moderate inflation economic assumptions with the white paper proposals. However, the main tables in the Actuarial Report are based on a non-escalating O.A.S. and G.I.S. while PENSIM assumes these payments will increase with the cost of living. Thus for comparison purposes, the PENSIM results in this chapter must be read with the capsule federal projections on page 52 of the Actuarial Report which does allow for such escalation.

The PENSIM output format is similar to that of the Actuarial Report where Table 1 in this chapter duplicates the style of Table 1B in the Report and Table 2 is similar to Table 3 in the Report. As explained in chapter XI, the third table in this chapter gives disaggregated information for revenues and costs of the plan.

The following table compares the PENSIM results with those of the Department of Insurance under the escalating O.A.S.-G.I.S. assumptions for the moderate inflation proposed plan.

PROJECTED INVESTMENT FUND LEVELS
($ Billions)

YEAR	PENSIM	FEDERAL[5]	DIFFERENCE
1975	8.2	8.5	0.3
1980	13.8	13.8	0.0
1985	18.6	18.9	0.3
1990	22.3	22.8	0.5
1995	22.5	23.2	0.7
2000	17.0	17.8	0.8

5. See page 52 of the Actuarial Report.

CANADA PENSION PLAN
SCHEME: MODERATE INFLATION PROPOSED PLAN
REGION: CANADA LESS QUEBEC RUN DATED 1/ 9/72

ASSUMPTIONS FOR THIS SCHEME

YEAR'S BASIC EXEMPTION IS 600. DOLLARS
INITIAL CONTRIBUTION RATE IS 3.60 PER CENT

RETIREMENT BENEFITS

RETIREMENT BENEFIT RATIO IS 0.250
PERCENTAGE OF LOWEST AER'S TO DROP OUT IS 15.0 PER CENT
EARNINGS TEST? - YES

DISABILITY BENEFITS

ANNUAL FLAT RATE IS 960. DOLLARS, BEGINNING IN 1973
PERCENTAGE OF BENEFIT THAT IS EARNINGS RELATED IS 100.0 PER CENT, BEGINNING IN 1973

CHILDREN'S BENEFITS

ANNUAL FLAT RATE IS 300. DOLLARS, BEGINNING IN 1967

WIVES' BENEFITS

ANNUAL FLAT RATE IS 960. DOLLARS, BEGINNING IN 1973

WIDOWS' BENEFITS

ANNUAL FLAT RATE IS 960. DOLLARS, BEGINNING IN 1973
PERCENTAGE OF BENEFIT THAT IS EARNINGS RELATED IS 75.0 PER CENT, BEGINNING IN 1973

ORPHANS' BENEFITS

ANNUAL FLAT RATE IS 300. DOLLARS, BEGINNING IN 1967

TABLE NO. 1

CANADA PENSION PLAN
BENEFITS AND EXPENSES OF ADMINISTRATION
(ALL FIGURES IN MILLIONS OF DOLLARS)

MODERATE INFLATION PROPOSED PLAN REGION: CANADA LESS QUEBEC

CALENDAR YEAR	RETIREMENT PENSIONS	DISABILITY PENSIONS				WIDOWS' PENSIONS		ORPHANS' BENEFITS	DEATH BENEFITS	EXPENSES OF ADMINISTRATION	TOTAL
		FLAT RATE	EARNINGS RELATED	CHILDREN'S BENEFITS	WIVES' PENSIONS	FLAT RATE	EARNINGS RELATED				
1970	32.0	19.5	32.7	10.3	19.7	12.1	16.5	10.6	14.7	21.6	189.7
1971	50.1	20.3	34.4	11.2	20.4	17.5	24.6	14.9	15.4	22.9	231.6
1972	73.8	21.1	36.1	12.1	21.2	23.0	33.4	19.8	16.9	24.2	281.6
1973	103.9	62.5	52.6	13.1	22.0	80.9	77.0	25.3	19.1	27.6	484.0
1974	143.2	65.2	59.5	14.1	22.8	96.2	95.2	31.4	22.2	31.0	580.9
1975	208.1	67.8	68.7	15.2	23.7	109.8	114.3	38.1	26.2	35.1	706.9
1976	259.9	70.4	79.1	16.1	24.6	126.4	139.2	40.7	30.4	37.6	824.5
1977	351.7	73.2	89.2	17.1	25.5	143.0	167.7	43.4	34.7	40.7	986.1
1978	465.2	76.0	99.6	18.0	26.4	159.3	199.5	45.9	39.4	44.2	1173.5
1979	606.6	78.8	111.1	19.0	27.4	175.0	236.1	48.2	44.8	47.6	1394.5
1980	792.6	109.3	186.3	19.9	35.9	188.2	272.7	50.3	50.3	51.5	1757.1
1981	911.7	113.9	201.7	20.3	37.4	205.0	317.8	50.7	55.8	56.1	1970.4
1982	1039.8	118.5	218.0	20.9	38.8	221.3	366.1	51.4	61.7	60.7	2197.3
1983	1185.5	123.0	234.7	21.6	40.3	237.1	420.5	52.5	68.1	65.5	2448.7
1984	1356.2	127.6	252.4	22.5	41.8	251.5	475.8	53.9	75.4	70.8	2727.9
1985	1564.1	142.8	303.7	23.5	47.3	262.8	528.5	55.6	81.6	78.8	3088.7
1986	1746.9	147.9	326.3	24.4	49.0	277.7	592.6	56.8	89.7	84.5	3395.8
1987	1942.4	152.9	349.9	25.4	50.8	292.0	662.8	58.2	98.3	90.7	3723.4
1988	2162.1	158.4	375.8	26.6	52.8	306.6	739.2	60.0	108.0	97.4	4087.0
1989	2408.7	163.8	404.2	27.9	54.8	319.7	815.5	61.9	118.8	104.4	4479.6
1990	2689.1	186.1	457.5	29.2	59.6	329.5	886.8	64.0	128.5	111.5	4941.9
1991	2950.7	192.3	490.3	30.5	61.9	343.9	979.2	66.1	140.2	119.3	5374.4
1992	3233.2	198.8	525.0	31.8	64.3	358.5	1078.5	68.4	152.7	127.4	5838.6
1993	3537.1	205.6	562.7	33.1	66.9	372.7	1183.2	70.6	166.4	136.1	6334.4
1994	3872.9	212.7	602.4	34.5	69.6	385.9	1289.3	72.9	181.4	145.2	6866.8
1995	4240.3	224.1	658.5	35.8	73.8	395.4	1388.6	75.0	194.6	155.5	7441.6
1996	4597.0	232.7	708.6	37.0	77.0	410.4	1516.6	77.1	211.0	166.3	8033.8
1997	4966.4	242.1	763.9	38.2	80.3	425.6	1651.9	79.0	228.6	177.8	8653.7

TABLE NO. 1 (Cont'd.)

CANADA PENSION PLAN
BENEFITS AND EXPENSES OF ADMINISTRATION
(ALL FIGURES IN MILLIONS OF DOLLARS)

MODERATE INFLATION PROPOSED PLAN REGION: CANADA LESS QUEBEC

CALENDAR YEAR	RETIREMENT PENSIONS	DISABILITY PENSIONS FLAT RATE	DISABILITY PENSIONS EARNINGS RELATED	DISABILITY PENSIONS CHILDREN'S BENEFITS	DISABILITY PENSIONS WIVES' PENSIONS	WIDOWS' PENSIONS FLAT RATE	WIDOWS' PENSIONS EARNINGS RELATED	ORPHANS' BENEFITS	DEATH BENEFITS	EXPENSES OF ADMINISTRATION	TOTAL
1998	5351.4	252.3	823.9	39.3	83.9	440.8	1794.0	80.8	247.4	190.2	9304.0
1999	5761.5	263.5	889.9	40.5	87.7	455.7	1941.6	82.4	268.0	203.8	9994.6
2000	6197.9	277.6	969.1	41.6	92.4	467.1	2074.8	83.9	288.2	218.4	10711.0
2001	6643.2	290.6	1050.2	42.6	96.7	485.9	2254.8	85.3	311.3	234.2	11494.9
2002	7115.5	304.3	1139.3	43.7	101.1	505.6	2446.2	86.6	336.3	251.2	12329.6
2003	7611.8	318.9	1235.8	44.7	105.6	525.8	2649.3	87.8	362.8	268.8	13211.4
2004	8139.2	334.3	1341.7	45.7	110.3	545.4	2852.9	89.0	391.4	288.2	14138.0
2005	8718.9	350.7	1457.1	46.8	115.3	562.3	3040.0	90.1	422.6	310.4	15114.2
2006	9334.3	367.8	1583.1	47.9	120.4	587.7	3294.6	91.4	455.5	332.0	16214.7
2007	10007.4	386.0	1718.8	49.0	125.6	614.8	3569.5	92.7	491.2	355.5	17410.6
2008	10729.9	405.0	1865.4	50.2	130.9	642.3	3855.0	94.1	529.2	379.9	18681.8
2009	11522.5	424.8	2024.5	51.4	136.3	669.2	4142.9	95.5	570.4	406.0	20043.7
2010	12398.8	448.9	2197.6	52.8	141.8	692.4	4404.9	97.0	615.0	433.4	21482.7
2011	13413.0	466.9	2364.0	54.2	147.0	725.8	4771.4	98.9	662.6	462.3	23166.1
2012	14543.6	485.0	2539.9	55.7	152.1	760.0	5157.6	100.9	713.8	492.4	25000.9
2013	15809.7	503.6	2726.2	57.3	157.2	795.1	5567.0	103.2	769.2	524.3	27012.7
2014	17205.5	521.9	2921.1	59.0	162.0	828.3	5978.2	105.5	828.4	557.6	29167.5
2015	18763.8	540.4	3127.1	60.7	166.9	856.4	6355.1	107.9	892.8	593.3	31464.4
2016	20446.0	558.4	3342.6	62.5	171.6	895.3	6880.8	111.0	961.5	630.4	34060.1
2017	22304.9	576.4	3568.6	64.4	176.3	935.0	7442.7	114.2	1035.9	670.1	36888.6
2018	24330.7	593.9	3802.6	66.4	180.8	974.1	8031.4	117.6	1115.4	711.4	39924.4
2019	26550.8	610.8	4044.4	68.5	185.3	1010.6	8629.4	121.1	1201.0	755.4	43177.3
2020	28979.3	627.2	4293.8	70.6	189.8	1040.1	9179.7	124.7	1295.4	802.3	46600.9
2021	31580.3	642.2	4540.4	72.7	194.0	1080.9	9940.2	128.6	1392.0	851.6	50431.9
2022	34414.2	656.6	4809.2	74.9	198.3	1122.1	10754.7	132.6	1498.1	903.4	54564.1
2023	37457.0	669.4	5071.4	77.2	202.4	1161.3	11602.7	136.6	1611.3	958.9	58948.1
2024	40751.8	681.0	5331.5	79.4	206.5	1197.0	12466.1	140.7	1733.0	1017.3	63604.3
2025	44289.8	690.6	5590.4	81.7	210.4	1223.0	[illegible]51.9	144.9	1863.3	1079.7	68425.6

TABLE NO. 2

CANADA PENSION PLAN
FUND PROJECTIONS
(ALL FIGURES IN MILLIONS OF DOLLARS)

MODERATE INFLATION PROPOSED PLAN

REGION: CANADA LESS QUEBEC

CALENDAR YEAR	CONTRIBUTIONS	BENEFITS & EXPENSES	FUND AT YEAR END
1970	776.4	189.7	3519.9
1971	822.8	231.6	4365.1
1972	870.5	281.6	5273.3
1973	991.8	484.0	6175.3
1974	1115.9	580.9	7154.0
1975	1264.6	706.9	8222.4
1976	1353.8	824.5	9338.2
1977	1464.0	986.1	10476.9
1978	1590.6	1173.5	11628.7
1979	1713.2	1394.5	12759.6
1980	1853.1	1757.1	13752.6
1981	2018.1	1970.4	14737.6
1982	2186.9	2197.3	15728.5
1983	2359.5	2448.7	16705.9
1984	2548.5	2727.9	17656.2
1985	2836.0	3088.7	18591.0
1986	3041.5	3395.8	19487.4
1987	3264.7	3723.4	20340.5
1988	3508.0	4087.0	21133.2
1989	3757.7	4479.6	21831.9
1990	4015.5	4941.9	22366.8
1991	4295.2	5374.4	22762.3
1992	4585.0	5838.6	22998.6
1993	4900.0	6334.4	23058.8
1994	5226.9	6866.8	22911.4
1995	5598.4	7441.6	22544.1
1996	5988.2	8033.8	21945.7
1997	6400.1	8653.7	21096.4

TABLE NO. 2 (Cont'd.)

CANADA PENSION PLAN
FUND PROJECTIONS
(ALL FIGURES IN MILLIONS OF DOLLARS)

MODERATE INFLATION PROPOSED PLAN

REGION: CANADA LESS QUEBEC

CALENDAR YEAR	CONTRIBUTIONS	BENEFITS & EXPENSES	FUND AT YEAR END
1998	6848.6	9304.0	19988.1
1999	7336.8	9994.6	18620.0
2000	7863.8	10711.0	17010.1
2001	8431.6	11494.9	15148.7
2002	9041.5	12329.6	13052.9
2003	9677.8	13211.4	10690.5
2004	10374.2	14138.0	8071.4
2005	11174.9	15114.2	5282.3
2006	11952.0	16214.7	2163.3
2007	**** CPP FUND IS EXHAUSTED ****		
2007	12797.9	17410.6	0.0
2008	13676.5	18681.8	0.0
2009	14616.8	20043.7	0.0
2010	15602.0	21482.7	0.0
2011	16642.4	23166.1	0.0
2012	17726.2	25000.9	0.0
2013	18875.5	27012.7	0.0
2014	20073.9	29167.5	0.0
2015	21357.2	31464.4	0.0
2016	22693.9	34060.1	0.0
2017	24124.7	36888.6	0.0
2018	25611.1	39924.4	0.0
2019	27195.9	43177.3	0.0
2020	28882.4	46600.9	0.0
2021	30656.9	50431.9	0.0
2022	32523.5	54504.1	0.0
2023	34523.4	58948.1	0.0
2024	36621.3	63604.3	0.0
2025	38868.2	68425.6	0.0

TABLE NO. 3

CANADA PENSION PLAN
REVENUE PROJECTIONS
(ALL FIGURES IN MILLIONS OF DOLLARS)

MODERATE INFLATION PROPOSED PLAN

REGION: CANADA LESS QUEBEC

CALENDAR YEAR	CONTRIBUTIONS	INTEREST	LOAN REPAYMENTS	TOTAL REVENUE	GROWTH IN TOTAL REVENUE (%)	BENEFITS & EXPENSES	NET REVENUE	GROWTH IN NET REVENUE (%)
1970	776.4	171.3	0.0	947.7	0.0	189.7	758.0	0.0
1971	822.8	231.9	0.0	1054.8	11.3	231.6	823.2	8.6
1972	870.5	295.3	0.0	1165.8	10.5	281.6	884.2	7.4
1973	991.8	360.8	0.0	1352.6	16.0	484.0	868.5	-1.8
1974	1115.9	422.4	0.0	1538.3	13.7	580.9	957.4	10.2
1975	1264.6	487.5	0.0	1752.1	13.9	706.9	1045.2	9.2
1976	1353.8	555.5	0.0	1909.3	9.0	824.5	1084.8	3.8
1977	1464.0	626.0	0.0	2090.0	9.5	986.1	1103.9	1.8
1978	1590.6	697.7	0.0	2288.3	9.5	1173.5	1114.8	1.0
1979	1713.2	770.2	0.0	2483.4	8.5	1394.5	1088.9	-2.3
1980	1853.1	841.0	0.0	2694.0	8.5	1757.1	936.9	-14.0
1981	2018.1	901.9	0.0	2920.0	8.4	1970.4	949.6	1.4
1982	2186.9	963.6	0.0	3150.5	7.9	2197.3	953.2	0.4
1983	2359.5	1025.6	0.0	3385.1	7.4	2448.7	936.4	-1.8
1984	2548.5	1086.4	0.0	3634.9	7.4	2727.9	907.0	-3.1
1985	2836.0	1145.4	0.0	3981.4	9.5	3088.7	892.7	-1.6
1986	3041.5	1203.4	383.3	4628.2	16.2	3395.8	1232.4	38.1
1987	3264.7	1262.6	764.5	5291.8	14.3	3723.4	1568.4	27.3
1988	3508.0	1321.8	718.7	5548.5	4.9	4087.0	1461.6	-6.8
1989	3757.7	1369.4	818.0	5945.1	7.1	4479.6	1465.5	0.3
1990	4015.5	1404.4	758.0	6177.9	3.9	4941.9	1236.1	-15.7
1991	4295.2	1424.1	823.2	6542.5	5.9	5374.4	1168.1	-5.5
1992	4585.0	1436.7	884.2	6905.8	5.6	5838.6	1067.3	-8.6
1993	4900.0	1440.6	868.5	7209.1	4.4	6334.4	874.7	-18.0
1994	5226.9	1435.8	957.4	7620.1	5.7	6866.8	753.3	-13.9
1995	5598.4	1419.7	1045.2	8063.3	5.8	7441.6	621.7	-17.5
1996	5980.2	1392.1	1084.8	8465.1	5.0	8033.8	431.4	-30.6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8653.7	200.0	[illegible]

TABLE NO. 3 (Cont'd.)

CANADA PENSION PLAN
REVENUE PROJECTIONS
(ALL FIGURES IN MILLIONS OF DOLLARS)

MODERATE INFLATION PROPOSED PLAN

REGION: CANADA LESS QUEBEC

CALENDAR YEAR	CONTRIBUTIONS	INTEREST	LOAN REPAYMENTS	TOTAL REVENUE	GROWTH IN TOTAL REVENUE (%)	BENEFITS & EXPENSES	NET REVENUE	GROWTH IN NET REVENUE (%)
1998	6848.6	1290.9	1314.8	9454.2	6.8	9304.0	150.3	-24.9
1999	7336.8	1228.2	1670.5	10235.6	8.3	9994.6	240.9	60.3
2000	7863.8	1173.1	1799.5	10836.4	5.9	10711.0	125.4	-48.0
2001	8431.6	1120.3	2703.0	12254.9	13.1	11494.9	760.0	506.1
2002	9041.5	1108.0	2780.4	12930.0	5.5	12329.6	600.4	-21.0
2003	9677.8	1085.1	2704.8	13467.7	4.2	13211.4	256.3	-57.3
2004	10374.2	1040.9	3864.9	15279.9	13.5	14138.0	1141.9	345.6
2005	11174.9	1056.1	3496.1	15727.1	2.9	15114.2	613.0	-46.3
2006	11952.0	1037.9	3413.7	16403.6	4.3	16214.7	188.9	-69.2
2007	12797.9	970.1	188.9	13957.0	-14.9	17410.6	-3453.7	-1928.0
2008	13676.5	643.7	-3453.7	10866.5	-22.1	18681.8	-7815.2	-126.3
2009	14616.8	40.7	-7815.2	6842.2	-37.0	20043.7	-13201.4	-68.9
2010	15602.0	-912.7	-13201.4	1487.9	-78.3	21482.7	-19994.8	-51.5
2011	16642.4	-2292.7	-19994.8	-5645.1	-479.4	23166.1	-28811.2	-44.1
2012	17726.2	-4241.3	-28811.2	-15326.3	-171.5	25000.9	-40327.3	-40.0
2013	18875.5	-6932.0	-40327.3	-28383.7	-85.2	27012.7	-55396.4	-37.4
2014	20073.9	-10589.6	-55396.4	-45912.1	-61.8	29167.5	-75079.6	-35.5
2015	21357.2	-15518.7	-75079.6	-69241.1	-50.8	31464.4	-100705.5	-34.1
2016	22693.9	-22105.0	-100705.5	-100116.7	-44.6	34060.1	-134176.7	-33.2
2017	24124.7	-30854.5	-134176.7	-140900.5	-40.7	36888.6	-177795.1	-32.5
2018	25611.1	-42424.2	-177795.1	-194608.2	-38.1	39924.4	-234532.6	-31.9
2019	27195.9	-57678.6	-234532.6	-265015.4	-36.2	43177.3	-308192.6	-31.4
2020	28883.4	-77726.8	-308192.6	-357037.0	-34.7	46600.9	-403637.9	-31.0
2021	30656.9	-103971.4	-403637.9	-476952.4	-33.6	50431.9	-527384.3	-30.7
2022	32523.5	-138300.8	-527384.3	-633161.5	-32.8	54564.1	-687725.7	-30.4
2023	34521.4	-183042.0	-687725.7	-836246.3	-32.1	58948.1	-895194.4	-30.2
2024	36623.3	-241246.3	-895194.4	-1099818.4	-31.5	63604.3	-1163423.7	-30.0
2025	38868.2	-316043.0	-1163423.7	-1441409.5	-31.1	68425.6	[illegible]	[illegible]

TABLE NO. 4

PLAN: MIPRO   AER: 1.00   PENSION INDEX CEILING: 1.02   RETIREMENT RATE: 0.25

WIDOW'S EARNINGS RELATED RATIO: 0.750   DISABILITY EARNINGS RELATED RATIO: 1.00

YEAR OF PENSION	YEAR'S MAXIMUM PENSIONABLE EARNINGS	MAXIMUM MONTHLY RETIREMENT PENSION	MAXIMUM MONTHLY WIDOW'S PENSION	MAXIMUM MONTHLY ORPHAN'S PENSION	MAXIMUM LUMP SUM PAYMENT	MAXIMUM MONTHLY DISABILITY PENSION	MAXIMUM MONTHLY PENSION TO WIFE OF DISABLED	MAXIMUM MONTHLY PENSION TO CHILD OF DISABLED	MONTHLY O.A.S.	MONTHLY G.I.S.
1973.	6300.	83.61	169.58	28.15	630.	199.44	80.00	28.15	85.86	69.54
1974.	7100.	105.00	180.04	28.71	710.	212.85	81.60	28.71	88.78	71.90
1975.	7800.	132.50	193.65	29.29	780.	230.45	83.23	29.29	91.62	74.20
1976.	8200.	160.42	205.21	29.87	820.	245.31	84.90	29.87	94.37	76.43
1977.	8700.	171.53	215.24	30.47	870.	258.12	86.59	30.47	97.20	78.72
1978.	9300.	181.94	224.78	31.08	930.	270.27	88.33	31.08	100.12	81.08
1979.	9800.	193.06	234.88	31.70	980.	283.15	90.09	31.70	103.12	83.51
1980.	10400.	204.86	245.54	32.34	1040.	296.76	91.89	32.34	106.22	86.02
1981.	11000.	216.67	256.23	32.98	1100.	310.40	93.73	32.98	109.40	88.60
1982.	11600.	229.17	267.48	33.64	1160.	324.77	95.61	33.64	112.69	91.26
1983.	12200.	241.67	278.77	34.31	1220.	339.19	97.52	34.31	116.07	94.00
1984.	12900.	254.86	290.62	35.00	1290.	354.33	99.47	35.00	119.55	96.82
1985.	13600.	268.75	303.02	35.70	1360.	370.21	101.46	35.70	123.14	99.72
1986.	14300.	283.33	315.99	36.42	1430.	386.82	103.49	36.42	126.83	102.71
1987.	15100.	298.61	329.52	37.14	1510.	404.17	105.56	37.14	130.63	105.79
1988.	16000.	315.28	344.13	37.89	1600.	422.95	107.67	37.89	134.55	108.97
1989.	16900.	333.33	359.82	38.64	1690.	443.16	109.82	38.64	138.59	112.24
1990.	17800.	352.08	376.08	39.42	1780.	464.10	112.02	39.42	142.75	115.60
1991.	18800.	371.53	392.91	40.21	1880.	485.79	114.26	40.21	147.03	119.07
1992.	19800.	391.67	410.29	41.01	1980.	508.21	116.54	41.01	151.44	122.64
1993.	20900.	413.19	428.77	41.83	2090.	532.07	118.88	41.83	155.98	126.32
1994.	22000.	435.42	447.82	42.67	2200.	556.67	121.25	42.67	160.66	130.11
1995.	23300.	459.72	468.47	43.52	2330.	583.40	123.68	43.52	165.48	134.02
1996.	24600.	485.42	490.21	44.39	2460.	611.57	126.15	44.39	170.45	138.04
1997.	25900.	512.50	513.05	45.28	2590.	641.17	128.67	45.28	175.56	142.18
1998.	27300.	540.28	536.45	46.18	2730.	671.53	131.25	46.18	180.83	146.44
1999.	28800.	569.44	560.90	47.11	2880.	703.32	133.87	47.11	186.25	150.84
2000.	30400.	600.69	587.07	48.05	3040.	737.25	136.55	48.05	191.84	155.36

TABLE NO. 4 (Cont'd)

PLAN: MIPRO AER: 1.00 PENSION INDEX CEILING: 1.02 RETIREMENT RATE: 0.25

WIDOW'S EARNINGS RELATED RATIO: 0.750 DISABILITY EARNINGS RELATED RATIO: 1.00

YEAR OF PENSION	YEAR'S MAXIMUM PENSIONABLE EARNINGS	MAXIMUM MONTHLY RETIREMENT PENSION	MAXIMUM MONTHLY WIDOW'S PENSION	MAXIMUM MONTHLY ORPHAN'S PENSION	MAXIMUM LUMP SUM PAYMENT	MAXIMUM MONTHLY DISABILITY PENSION	MAXIMUM MONTHLY PENSION TO WIFE OF DISABLED	MAXIMUM MONTHLY PENSION TO CHILD OF DISABLED	MONTHLY O.A.S.	MONTHLY G.I.S.
2001.	32100.	634.03	614.80	49.01	3210.	773.31	139.28	49.01	197.60	160.02
2002.	33900.	669.44	644.15	49.99	3390.	811.51	142.07	49.99	203.52	164.82
2003.	35700.	706.25	674.60	50.99	3570.	851.16	144.91	50.99	209.63	169.77
2004.	37700.	745.14	706.66	52.01	3770.	892.95	147.81	52.01	215.92	174.86
2005.	39800.	786.11	740.35	53.05	3980.	936.87	150.76	53.05	222.40	180.11
2006.	42000.	829.86	776.17	54.11	4200.	983.64	153.78	54.11	229.07	185.51
2007.	44300.	875.69	813.62	55.19	4430.	1032.55	156.85	55.19	235.94	191.07
2008.	46700.	923.61	852.70	56.30	4670.	1083.60	159.99	56.30	243.02	196.81
2009.	49300.	974.31	893.92	57.42	4930.	1137.50	163.19	57.42	250.31	202.71
2010.	52000.	1027.78	937.29	58.57	5200.	1194.23	166.45	58.57	257.82	208.79
2011.	54900.	1084.72	983.33	59.74	5490.	1254.51	169.78	59.74	265.55	215.06
2012.	57900.	1144.44	1031.51	60.94	5790.	1317.62	173.18	60.94	273.52	221.51
2013.	61100.	1207.64	1082.37	62.16	6110.	1384.28	176.64	62.16	281.72	228.15
2014.	64400.	1273.61	1135.38	63.40	6440.	1453.79	180.18	63.40	290.18	235.00
2015.	68000.	1343.75	1191.59	64.67	6800.	1527.53	183.78	64.67	298.88	242.05
2016.	71700.	1417.36	1250.48	65.96	7170.	1604.82	187.46	65.96	307.85	249.31
2017.	75700.	1495.83	1313.08	67.28	7570.	1687.04	191.20	67.28	317.08	256.79
2018.	79800.	1577.78	1378.36	68.63	7980.	1772.81	195.03	68.63	326.60	264.49
2019.	84200.	1664.58	1447.37	70.00	8420.	1863.51	198.93	70.00	336.39	272.43
2020.	88900.	1756.25	1520.09	71.40	8890.	1959.16	202.91	71.40	346.49	280.60
2021.	93800.	1853.47	1597.07	72.83	9380.	2060.44	206.97	72.83	356.88	289.02
2022.	98900.	1955.56	1677.77	74.28	9890.	2166.66	211.10	74.28	367.59	297.69
2023.	104400.	2063.19	1762.72	75.77	10440.	2278.57	215.33	75.77	378.61	306.02
2024.	110100.	2176.39	1851.93	77.28	11010.	2390.02	219.63	77.28	389.97	315.82
2025.	116200.	2296.53	1946.42	78.83	11620.	2520.55	224.05	78.83	401.67	325.29

APPENDIX

The ten source programs used in the PENSIM model are listed in this appendix for those who wish to duplicate the results of the Ontario model. All programs are written in standard FORTRAN - IV and were designed to operate on an interactive basis using a PDP-10 computer.

Other users are cautioned that this computer is an octal machine, differing from the IBM 360 or 370 series. Thus programming changes will be necessary to accomodate the PENSIM model on other computers.

While the program versions in this appendix are the most recent ones, continuous updates and revisions are taking place. However, the programs listed here were used to generate the output in chapter xiv and any output can be compared on that basis.

```
C                    VERSION AS OF 12:00 AUGUST 11,1972
C     PROGRAMME POP.1
C     LAGRANGEAN POLYNOMIAL INTERPOLATION PROGRAM USING
C     FOUR INTERPOLATION POINTS MOVING THROUGH TIME ON A FIFTEEN
C     YEAR INTERVAL. THE PROGRAM IS USED TO INTERPOLATE POPULATION
C     STATISTICS BETWEEN FIVE YEAR INTERVALS.
C     PROGRAM WRITTEN BY T.S.LETT ON JAN. 5 1972 FOR THE
C     TAXATION AND FISCAL POLICY BRANCH OF THE ONTARIO GOV'T.
C
      DIMENSION W(4,60),KSUB(8),FAC(4),XNUM(15),NO(24),POPM(19,13)
     +,POPF(19,13),POP(19,60,2)
      DATA NO /5,10,15,1,10,15,1,5,15,1,5,10,20,25,30,15,25,30,15,
     +20,30,15,20,25/
      DATA KSUB /1,4,7,10,13,16,19,22/
      DATA W,FAC,XNUM,POP /240*0.,4*0.,15*0.,2280*0./
      DATA LM,NN,NNN,L,LL,LK /0,1,15,1,1,0/
      CALL IFILE(20,'PRJM1')
      CALL IFILE(21,'PRJF1')
      CALL IFILE(22,'PRJM')
      CALL IFILE(23,'PRJF')
      READ(20,100)(POPM(I,1),I=1,19)
      READ(21,100)(POPF(I,1),I=1,19)
      READ(22,100)((POPM(I,J),J=2,13),I=1,19)
      READ(23,100)((POPF(I,J),J=2,13),I=1,19)
  100 FORMAT(12G)
      GO TO 4
    3 L=2
      LK=15
    4 DO 10 J=1,4
      LM=LM+1
      DO 10 I=1,15
      KK=KSUB(LM)
      IF(J.NE.1) GO TO 1
      IF(L.EQ.2) GO TO 1
      FAC(J)=(LM-NO(KK))*(LM-NO(KK+1))*(LM-NO(KK+2))
      GO TO 2
    1 FAC(J)=((LM-L)*5-NO(KK))*((LM-L)*5-NO(KK+1))*((LM-L)*5
     +-NO(KK+2))
    2 XNUM(I)=(I+LK-NO(KK))*(I+LK-NO(KK+1))*(I+LK-NO(KK+2))
      W(J,I)=XNUM(I)/FAC(J)
   10 CONTINUE
      IF(LM.EQ.8) GO TO 5
   13 DO 11 I=NN,NNN
      IF(I.EQ.16.OR.I.EQ.31.OR.I.EQ.46) LL=LL+3
      DO 11 J=1,19
      POP(J,I,1)=W(1,I)*POPM(J,LL)+W(2,I)*POPM(J,LL+1)+W(3,I)
     +*POPM(J,LL+2)+W(4,I)*POPM(J,LL+3)
      POP(J,I,2)=W(1,I)*POPF(J,LL)+W(2,I)*POPF(J,LL+1)+W(3,I)
     +*POPF(J,LL+2)+W(4,I)*POPF(J,LL+3)
   11 CONTINUE
      IF(NNN.EQ.60) GO TO 14
      GO TO 3
    5 DO 12 M=1,4
      DO 12 N=1,15
      W(M,N+15)=W(M,N)
      W(M,N+30)=W(M,N)
   12 W(M,N+45)=W(M,N)
      NN=16
      NNN=60
      GO TO 13
   14 CALL OFILE(24,'ONE')
      WRITE(24,15)(((POP(I,J,K),J=1,60),I=1,19),K=1,2)
   15 FORMAT(1H ,10(F6.1,1X))
      STOP
      END
```

```
C VERSION AS OF 12:00 AUGUST 11,1972
C PROGRAMME INDEX.2
  REAL YMPE(60),PNIND(60),CPI(60),ERIND(60),AVINC(60),CPINC(60)
  REAL AVERN(60)
  DATA AVINC/1.0,1.07,1.066,1.065,56*0./
  DATA YMPE/5000.,5000.,5100.,5200.,5300.,5400.,5500.,53*0./
  DATA PNIND/109.4,109.4,111.6,113.8,116.1,118.4,54*0./
  DATA CPI/111.4,115.4,120.1,125.5,129.7,133.4,54*0./
  DO 100 J=1,3
  K=1972+J
  TYPE 110,K
110 FORMAT(' SPECIFY YMPE IN ',I4,': ',$)
  ACCEPT 120, YMPE(7+J)
120 FORMAT(G)
100 CONTINUE
  DO 130 J=1,6
  K=1969+J
  TYPE 140, K
140 FORMAT(' SPECIFY GROWTH IN AVERAGE EARNINGS IN ',I4,'(EG 1.035)
     &: ',$)
  ACCEPT 120, AVINC(4+J)
130 CONTINUE
  DO 210 J=1,6
  K=1969+J
  TYPE 220, K
220 FORMAT(' SPECIFY CHANGE IN CPI IN ',I4,' (EG 1.01): ',$)
  ACCEPT 120, CPINC(4+J)
210 CONTINUE
  TYPE 142
142 FORMAT(' SPECIFY CEILING ON PENSION INDEX (EG 1.02): ',$)
  ACCEPT 120, CEILNG
  DO 150 J=11,60
150 AVINC(J)=AVINC(10)
  AVERN(1)=1.
  DO 160 J=2,60
160 AVERN(J)=AVERN(J-1)*AVINC(J)
  DO 170 J=1,8
170 ERBAS=ERBAS+AVERN(J)
  DO 180 J=11,60
  SUM=0.
  DO 190 K=2,9
190 SUM=AVERN(J-K)+SUM
180 ERIND(J)=SUM/ERBAS
  DO 200 J=11,60
200 YMPE(J)=(IFIX((YMPE(10)*ERIND(J))/100.))*100.
  DO 230 J=11,60
230 CPINC(J)=CPINC(10)
  DO 240 J=7,60
240 CPI(J)=CPI(J-1)*CPINC(J)
  DO 250 J=2,60
250 CPI(J)=((CPI(J)+CPI(J-1))/2.)
C THIS CALCULATION OF CPI GIVES US THE VALUE OF AVERAGE CPI FOR
C THE 12 MONTHS ENDING ON JUNE 30 OF YR "J"
  DO 260 J=7,60
  PNIND(J)=PNIND(J-1)*CEILNG
  IF(CPI(J-1).LT.PNIND(J))PNIND(J)=CPI(J-1)
  IF(PNIND(J).LT.(1.01*PNIND(J-1)))PNIND(J)=PNIND(J-1)
260 CONTINUE
  DO 270 J=1,60
  AVERN(J)=AVERN(J)/1.07
270 PNIND(J)=PNIND(J)/1.094
  CALL OFILE(25,'TXFPB')
  CALL OFILE(26,'TFPNX')
  CALL OFILE(27,'TFIND')
  WRITE(25,300) (YMPE(J),J=1,60)
  WRITE(26,301) (PNIND(J),J=1,60)
  WRITE(27,302) (AVERN(J),J=1,60)
300 FORMAT(10(F7.0,1X))
301 FORMAT(10(F6.2,1X))
302 FORMAT(10(F6.3,1X))
  STOP
  END
```

```
C VERSION AS OF 12:00 AUGUST 11,1972
C PROGRAMME MMAE.3. THIS IS THE THIRD PROGRAMME IN THE CPP
C SET OF PROGRAMMES.IT IS USED TO CALCULATE MODIFIED MOD-
C IFIED AVERAGE EARNINGS USING THE METHODS OF THE DEPT. OF
C INSURANCE IN OTTAWA.FOR ADDITIONAL INFORMATION CONSULT
C THE CPP DOCUMENTATION FILE.PROGRAMME WRITTEN BY G.JACOBS
C AND T.LETT FOR THE TAXATION AND FISCAL POLICY BRANCH,
C JAN-FEB 1972.
C
  REAL YMPE(60),AVERN(11,60,2),INDEX(60),YPE(60),ADJ(22),FILE(10)
        COMMON /IODATA/ VALU(11,60,8)
  DATA FILE/'RSCUR','MICUR','RSPRO','MIPRO','TXFPB','MMRSC','MMMIC
     +','MMRSP','MMMIP','MMTFP'/
C
C THIS SECTION IS USED TO INPUT VALUES OF YMPE THAT ARE TO BE
C USED IN THE PROGRAMME CPP.  THE FOUR POSSIBILITIES ARE:
C RSCUR  WHICH IS REASONABLE STABILITY UNDER THE CURRENT PLAN
C RSPRO  WHICH IS REASONABLE STABILITY UNDER THE PROPOSED PLAN
C MICUR  WHICH IS MODERATE INFLATION UNDER THE CURRENT PLAN
C MIPRO  WHICH IS MODERATE INFLATION UNDER THE PROPOSED PLAN
C THE VALUES ARE STORED IN THE DATA FILE WITH THE SAME NAME
C WITH TEN VALUES PER LINE.  THE VALUES OF YMPE ARE OBTAINED BY
C USING THE ASSUMPTIONS ON PG. 23 OF THE ACTUARIAL REPORT FOR
C THE INFLATION FACTORS AND BY APPLYING THE EARNINGS INDEX FOR
C THE YEARS 1966-2025
C
2 TYPE 20
1 FORMAT(10G)
20 FORMAT(' TYPE IN PLAN TO BE TESTED:  ',$)
  ACCEPT25,FNAME
25 FORMAT(A5)
  DO 26 IK=1,5
26 IF(FNAME.EQ.FILE(IK))GO TO 28
  TYPE27,FNAME
27 FORMAT(1X,A5,' ?, TRY AGAIN'/)
  GO TO 2
28 CALL OFILE(29,FILE(IK+5))
  CALL IFILE(22,FNAME)
  READ(22,1) (YMPE(I),I=1,60)
  CALL IFILE(28,'ADJFC')
  READ(28,427) (ADJ(I),I=1,22)
427 FORMAT(9G)
C
C THE NEXT SECTION INPUTS THE AVERAGE EARNINGS OF MALES AND FEMALE
C IN 1967 AND MULTIPLIES THIS FIGURE BY AN INDEX TO REFLECT
C THE INCREASE ANNUALLY AND THUS CALCULATE AVERAGE EARNINGS BY AGE
C AND SEX IN ALL YEARS 1966-2025.  THE INDEX FACTORS
C ARE OBTAINED FROM THE ASSUMPTIONS OF THE ANNUAL INCREASE
C IN AVERAGE EARNINGS FOUND ON PAGE 23 OF THE ACTUARIAL
C REPORT.THE REASONABLE STABILITY INDEX IS STORED IN RSIND.DAT
C AND THE MODERATE INFLATION INDEX IS STORED IN MIIND.DAT
C
  CALL IFILE(23,'AVE67')
  READ(23,1) ((AVERN(I,2,K),I=1,11),K=1,2)
  GO TO (30,32,30,32,31),IK
32 CALL IFILE(24,'MIIND')
  GO TO 35
30 CALL IFILE(24,'RSIND')
  GO TO 35
31 CALL IFILE(24,'TFIND')
35 READ(24,1) (INDEX(I),I=1,60)
  DO 40 K=1,2
  DO 40 J=1,60
  DO 40 I=1,11
40 AVERN(I,J,K)=AVERN(I,2,K)*INDEX(J)
C
C THE NEXT SECTION IS USED TO CALCULATE YBE WHICH IS 12% OF YMPE
C ROUNDED DOWN TO THE NEAREST 100 IN THE CURRENT PLANS AND A
C FLAT AMOUNT OF 600 IN THE PROPOSED PLANS
C
  GO TO (60,60,61,61,62),IK
```

```
62 TYPE63
63 FORMAT(1X'YBE CALCULATION CURRENT/PROPOSED ?'/)
  ACCEPT25,ANS
  IF(ANS.EQ.'CURRE') GO TO 60
61 DO 55 I=1,60
55 YBE(I)=600
  GO TO 70
60 DO 65 I=1,60
65 YBE(I)=(IFIX(.12*YMPE(I)+1)/100)*100
C
C WE INSERT THE +1 ABOVE TO ACCOUNT FOR INTEGER DIVISION
C THE NEXT SECTION CALCULATES THE X VALUES REQUIRED FOR THE SPLINE
C SUBROUTINE TO CALCULATE THE CORRESPONDING Y VALUES USED IN
C THE CALCULATION OF MODIFIED MODIFIED AVERAGE EARNINGS.
C
70 JJ=4
   DO 81 K=1,2
  DO 80 J=1,60
  DO 80 I=1,11
  VALU(I,J,K+JJ)=100*YMPE(J)/AVERN(I,J,K)
80 VALU(I,J,K+1+JJ)=100*YBE(J)/AVERN(I,J,K)
81 JJ=5
        CALL SPLINE
C
C THE FOLLOWING SECTION CALCULATES MODIFIED MODIFIED AVERAGE
C EARNINGS IN ONE STEP.THE  INTERPOLATED Y VALUES FROM SPLINE
C ARE USED TO CALCULATE THE TEMPORARY MODIFIED AVERAGE EARN-
C INGS WHICH ARE IN TURN USED TO CALCULATE THE MODIFIED AVE-
C RAGE EARNINGS FROM WHICH MODIFIED MODIFIED AVERAGE EARNINGS
C ARE DERIVED.SEE COLUMN 10 WORKSHEET DO-5 FOR METHOD.
C
        JJ=0
        DO 90 K=1,2
  DO 91 I=1,11
  DO 91 J=1,60
  91    VALU(I,J,K)=(((AVERN(I,J,K)*(VALU(I,J,JJ+3)-VALU(I,J,
     &JJ+4)))+(YMPE(J)*(100-VALU(I,J,JJ+1))))/(100-VALU(I,J,
     &JJ+2)))*ADJ(I+(JJ*3)-K+1)*(YMPE(1)/YMPE(J))
  90    JJ=4

C THIS CALCULATION IS USED TO OBTAIN THE MODIFIED
C MODIFIED AVERAGE EARNINGS LEVELS BY AGE GROUP AND SEX AND
C YEAR (1966-2025).  THE METHOD USED IS ADAPTED FROM THAT OF
C THE FEDERAL DEPT. OF INSURANCE THAT THEY USED IN THE 1969
C CPP ACTUARIAL REPORT.  THE MATRIX AVERN IS EXPLAINED ABOVE.
C THE RESULTANT 'Y' FACTORS FROM SPLINE ARE STORED IN VALU.
C THE VECTOR ADJ CONTAINS TWO GROUPS OF 11 ADJUSTMENT FACTORS
C (MALE AND FEMALE) WHICH SCALE THE RESULTS FROM SPLINE.
C THIS OPERATION IS NECESSARY BECAUSE THE DATA USED IN
C SPLINE RELIED ON THE 40-44 AGE GROUP.THE ADJUSTMENT FACTOR
C SCALES THE RESULTS INTO 11 AGE GROUPS INSTEAD OF ONE.
C THE VALUES IN THIS VECTOR WERE OBTAINED FROM WORKSHEETS
C DO-5 AND DO-8 FROM THE DEPT. OF INSURANCE. THE FINAL FACTOR
C WHICH IS THE RATIO OF YMPE'S IS USED TO BRING THE MODIFIED
C AVERAGE EARNING FIGURE BACK TO 1966 CONSTANT VALUES AND
C THUS OBTAIN THE MODIFIED MODIFIED AVERAGE EARNINGS
C MATRIX FOR ALL FURTHER CALCULATIONS IN THIS MODEL.
  TYPE 94,FILE(IK+5)
94 FORMAT(' OUTPUT FILE IS ',A5,'.DAT'/)

        WRITE(29,95) (((VALU(I,J,K),J=1,60),I=1,11),K=1,2)
95 FORMAT(5(F7.0,1X))

C
C THE OUTPUT IS STORED IN FILES WITH AN 'MM' PREFIX(MODIFIED
C MODIFIED) WITH A CORRESPONDING SUFFIX FROM THE OPTION
C TESTED.THESE FILES ARE STORED ON DECTAPE D423 FOR FUTURE
C USE IN PROGRAMME RETBN.4.
C
100 FORMAT(' ',9(F7.3,1X))
  STOP
```

```
      END
      SUBROUTINE SPLINE
C
C THIS SUBROUTINE INTERPOLATES Y VALUES FROM GIVEN
C X VALUES USING THE CUBIC SPLINE METHOD.A SET OF ORDERED PAIRS
C CREATES AN INTERPOLATING EQUATION.THE ORDERED PAIRS ARE READ
C IN FROM THE FILE POINT.DAT ALONG WITH THE FIRST DERIVATIVES OF
C THE END POINTS(D(1),D(2)).THE INTERPOLATING X VALUES ARE CARRIED
C THROUGH COMMON IN THE ARRAY VALU.THE INTERPOLATED Y VALUES
C ARE RETURNED THROUGH THE SAME ARRAY TO THE MAIN PROGRAMME.

C
            REAL X(31),Y(31),C(100),W(100)
      INTEGER KSUB(8),D(2)
            COMMON /IODATA/ VALU(11,60,8)
            DATA C,W,K1,N,KSUB/200*0.,0,31,1,2,3,4,5,6,7,8/
            CALL IFILE(20,'POINT')
2     IF(K2.EQ.8) GO TO 1
      IF(K1.EQ.0.OR.K1.EQ.2) MI=5
      IF(K1.EQ.4.OR.K1.EQ.6) MI=7
            READ(20,111)J,(D(I),I=1,2)
            READ(20,111)(X(I),I=1,N)
            READ(20,111)(Y(I),I=1,N)
111         FORMAT(10G/9G/9G/3G)
C
C          THIS SCALING IS USED ONLY FOR THE CPP DATA
C          AND SHOULD BE REMOVED FOR ANY OTHER DATA SOURCES.
C
            DO 35 I=1,N
            X(I)=X(I)*100
      35    Y(I)=Y(I)*100
            Q=X(2) - X(1)
            YI =Y(2) - Y(1)
            IF (J.EQ.2) GO TO 100
            C(1)=Q*D(1)
            C(2)=1.0
            W(2)=YI-C(1)
            GO TO 200
100         C(2)=0.0
            W(2)=0.5*Q*Q*D(1)
200         M=N-2
            IF(M.LE.0) GO TO 350
            DO 1000 I=1,M
            AI=Q
            Q=X(I+2)- X(I+1)
            H=AI/Q
            C(3*I)=-H/(2.0-C(3*I-1))
            W(3*I)=(-YI-W(3*I-1))/(2.0 - C(3*I-1))
            C(3*I+1)=-H*H/(H-C(3*I))
            W(3*I+1)=(YI-W(3*I))/(H-C(3*I))
            YI=Y(I+2)- Y(I+1)
            C(3*I+2)=1.0/(1.0-C(3*I+1))
1000         W(3*I+2)=(YI-W(3*I+1))/(1.0-C(3*I+1))
350         IF(J.EQ.1) GO TO 400
            C(3*N-3)=(Q*Q*D(2)/2.0-W(3*N-4))/(3.0- C(3*N-4))
            GO TO 500
400         C(3*N-3)=(Q*D(2)-YI-W(3*N-4))/(2.0-C(3*N-4))
500         M=3*N-6
            IF(M.LE.0) GO TO 700
            DO 600 II=1,M
            I=M-II+3
600         C(I)=W(I)-C(I)*C(I+1)
700         IF(J.EQ.1) GO TO 800
            C(1)=Y(2) - Y(1)-W(2)-C(3)
            C(2)=W(2)
            GO TO 8
800         C(2)=W(2)-C(3)
      8 K1=K1+1
      K2=KSUB(K1)
```

```
      DO 9 IJ=1,11
      DO 9 IK=1,60
      DO 10 I=2,30
 10   IF(VALU(IJ,IK,MI).LT.X(I)) GO TO 20
 I=N
 20   Z=(VALU(IJ,IK,MI)-X(I-1))/(X(I)-X(I-1))
      VALU(IJ,IK,K2)=((Z*C(3*I-3)+C(3*I-4))*Z+C(3*I-5))
   +  *Z+Y(I-1)
9  IF(VALU(IJ,IK,K2).GT.100.) VALU(IJ,IK,K2)=100.
      IF((MI/2)*2.EQ.MI) GO TO 2
      MI=MI+1
      GO TO 8
  1   RETURN
      END
```

```
C LATEST UPDATE 12:00 AUGUST 11,1972
C PROGRAM RETBN.4 IS USED TO CALCULATE THE COSTS OF THE
C CANADA PENSION PLAN RETIREMENT BENEFITS.  THE PROGRAM
C REQUIRES A DATA FILE OF MODIFIED MODIFIED AVERAGE
C EARNINGS (SEE PROGRAM MMAE.3) AND A DESIGNATION OF
C PLAN BEING TESTED (INPUT FROM TTY).
  REAL MMAE(11,60,2),PART(11,10),PMMAE(11,60,2),SUM(-12/11,2)
  REAL FILE(25),POP(19,60,2),TEM1(-12/11),FACTOR(15,60,2)
  REAL TPNER(-12/11,2),TEM(-12/11,2),DSDRP(-12/11,9)
  REAL YMPE(60),PNIND(60),ESC1(60),RTFAC(-12/11,2),DREDC(60)
  REAL PINDIV(-12/11,47,2),RTCST(60,3),ESC2(60),RFAC(2,5,2)
  REAL SURVRT(15,8,2),NMDTH(15,60,2),DTHCS1(60,3),DTHCS2(60,2)
  INTEGER JJ(22),NN(13),YR(60),FRSTYR(-12/10),LASTYR(10)
  INTEGER YRSPRT(-12/10)
  COMMON/IODATA/INDIV(-12/11,47,2),EXPOS(-12/11),DROP(-12/11,2),
     &  NR,DRPRT
  DATA PART/.65,3*1.0,3*.93,2*.87,.78,.53,.68,3*1.0,3*.94,2*.88,
     &  .79,.54,.46,.66,.44,6*.36,.25,.13,.5,.69,.5,6*.42,.29,.13,.53,
     &  .73,.57,6*.48,.34,.14,.58,.75,.58,6*.49,.35,.14,.46,.66,.44,
     &  6*.36,.25,.13,.49,.68,.5,6*.41,.29,.13,.53,.71,.56,6*.47,
     &  .33,.14,.55,.73,.57,6*.48,.34,.14/
  DATA JJ/5,10,15,20,25,30,35,40,45,50,55,60,65,70,
     &75,80,85,90,95,100,105,110/
  DATA NN/8,13,18,23,28,33,38,43,48,53,58,63,68/
  DATA FRSTYR/14*18,21,26,31,36,41,46,51,56,61/
  DATA LASTYR/20,25,30,35,40,45,50,55,60,65/
  DATA FILE/
     &'RSCUR','MICUR','RSPRO','MIPRO','TXFPB','MMRSC','MMMIC','MMRSP',
     &'MMMIP','MMTFP','DHRSC','DHMIC','DHRSP','DHMIP','DHTFP','RTRSC',
     &  'RTMIC','RTRSP','RTMIP','RTTFP','DBRSC','DBMIC','DBRSP','DBMIP
     &  'DBTFP'/
      DATA DSDRP/14*1.002,10*1.,14*1.003,1.002,9*1.,14*1.004,2*1.003,8
     &.,14*1.005,2*1.004,1.003,7*1.,14*1.006,2*1.0055,1.0045,1.003,6*1
     &  16*1.007,2*1.006,1.004,5*1.,18*1.0085,1.0075,1.005,4*1.,16*1.0
     &  3*1.011,1.01,1.007,3*1.,17*1.015,1.016,2*1.017,3*1.012,1./
  DATA RFAC/61.,71.,86.,114.,115.,167.,148.,232.,189.,309.,
     &  21.,12.,30.,20.,42.,31.,55.,45.,73.,61./
  CALL CLOCK1
C THE NEXT SECTION IS USED TO INPUT THE VARIOUS POLICY OPTIONS
C THAT ARE TO BE TESTED FOR THIS RUN
19 TYPE 20
20 FORMAT(' TYPE IN PLAN TO BE TESTED:  ',$)
  ACCEPT 25, FNAME
  DO 21 IK=1,5
21 IF(FNAME.EQ.FILE(IK))GO TO 24
  TYPE 23, FNAME
23 FORMAT(1X,A5,'? TRY AGAIN! '/)
  GO TO 19
22 FORMAT(1G)
25 FORMAT(A5)
24 TYPE 26
26 FORMAT(' TYPE IN DROPOUT RATE (0-1): ',$)
  ACCEPT22,DRPRT
  TYPE 27
27 FORMAT(' TYPE IN RETIREMENT PENSION RATE (0-1): ',$)
  ACCEPT22,RETRT
  TYPE 28
28 FORMAT(' DO YOU WANT EARNINGS TEST? (YES/NO): ',$)
  ACCEPT29,ERNTST
29 FORMAT(A2)
  TYPE 30
30 FORMAT(' OUTPUT? (TABLE/DATA): ',$)
  ACCEPT29,OUT
C THE NEXT SECTION READS IN THE YMPE VALUES, THE POPULATION DATA,
C THE SURVIVAL RATES, AND THE PENSION INDEX TO BE USED DEPENDING
C ON THE POLICY VARIABLES BEING TESTED.
  CALL IFILE (22,FNAME)
  READ (22,1) (YMPE(I),I=1,60)
1 FORMAT(10G)
  CALL IFILE(24,'ONE')
```

```
      READ(24,1) (((POP(I,J,K),J=1,60),I=1,10),K=1,2)
      CALL IFILE(25,'SURVM')
      READ(25,9) (((SURVRT(I,J,K),J=1,8),I=1,15),K=1,2)
    9 FORMAT(8G)
      GO TO (36,37,36,37,38)IK
   36 CALL IFILE(23,'RSPNX')
      CALL IFILE(26,'RSDRD')
      GO TO 39
   37 CALL IFILE(23,'MIPNX')
      CALL IFILE(26,'MIDRD')
      GO TO 39
   38 CALL IFILE(23,'TFPNX')
      TYPE 2
    2 FORMAT(' ECONOMIC ASSUMPTIONS? (RS/MI): ',$)
      ACCEPT 29,ANS
      IF(ANS.EQ.'MI')GO TO 37
      GO TO 36
   39 READ(23,1) (PNIND(I),I=1,60)
      READ(26,1) (DREDC(I),I=1,60)
C THE NEXT SECTION INPUTS THE APPROPRIATE DATA FOR THE MODIFIED
C MODIFIED AVERAGE EARNINGS AS CALCULATED IN PROGRAM MMAE.3
    3 CALL IFILE(21,FILE(IK+5))
      CALL OFILE(27,FILE(IK+20))
      CALL OFILE(28,FILE(IK+15))
      CALL OFILE(29,FILE(IK+10))
      READ(21,35) (((MMAE(I,J,K),J=1,60),I=1,11),K=1,2)
   35 FORMAT(5G)
      IF((IK/2)*2.EQ.IK.OR.(IK.EQ.5.AND.ANS.EQ.'MI'))GO TO 5
      IMI=4
      GO TO 6
    5 IMI=0
    6 JJJ=0
      DO 8 K=1,2
      DO 7 I=1,11
      DO 7 J=1,60
            N1=1
      IF(K.EQ.1.AND.J.GE.20) N1=2
      IF(K.EQ.2.AND.J.GE.1)  N1=3
      IF(K.EQ.2.AND.J.GE.10) N1=4
      IF(K.EQ.2.AND.J.GE.20) N1=5
      IF(K.EQ.2.AND.J.GE.40) N1=6
C THE NEXT CALCULATION MULTIPLIES THE MATRIX OF MODIFIED MODIFIED
C AVERAGE EARNING BY THE APPROPRIATE LABOUR FORCE PARTICIPATION
C RATE DEPENDING ON THE SEX,THE YEAR AND THE PLAN BEING TESTED
    7 PMMAE(I,J,K)=MMAE(I,J,K)*PART(I,JJJ+N1)
    8 JJJ=JJJ+IMI
C THE NEXT SECTION PERFORMS A MATRIX TRANSFORMATION WHEREBY THE
C MMAE'S FOR ANY AGE GROUP (E.G. AGE -25 IN 1965; AGE 0 IN
C 1965; AGE 35 IN 1965) ARE TRANSFORMED INTO A ROW OF
C VALUES.  THIS SIMPLIFIES THE DIAGONAL STEP-WISE ADDITION OF
C MMAE'S FOR ALL AGE GROUPS AND ALSO SIMPLIFIES THE CALCULATION
C OF EARNINGS DROPPED OUT IN SUBROUTINE MIN.  THE TRANSFORMATION
C IS DONE FOR THE MATRIX OF MMAE'S AND THE MATRIX OF PARTICIPATING
C MMAE'S (PMMAE).  THE TRANSFORMED MATRICES ARE CALLED INDIV AND
C PINDIV
      DO 70 K=1,2
      DO 70 I=2,10
      DO 70 J=1,4
      INDIV(I,J,K)=MMAE(I,J,K)
   70 PINDIV(I,J,K)=PMMAE(I,J,K)
      DO 80 K=1,2
      DO 80 I=2,9
      DO 80 L=I+1,10
      MM=JJ(L-I)
      DO 80 J=MM,MM+4
      INDIV(I,J,K)=MMAE(L,J,K)
   80 PINDIV(I,J,K)=PMMAE(L,J,K)
      DO 90 K=1,2
      DO 90 I=0,-12,-1
      N2=NN(-(I-1))
```

```
      IF(N2.GT.60)N2=60
      INDIV(I,1,K)=MMAE(1,N2,K)
      INDIV(I,2,K)=MMAE(1,N2+1,K)
      PINDIV(I,1,K)=PMMAE(1,N2,K)
   90 PINDIV(I,2,K)=PMMAE(1,N2+1,K)
      J=0
      DO 100 K=1,2
      DO 100 I=1,-12,-1
      DO 100 L=2,10
      MM=JJ(L-I)
      DO 100 J=MM,MM+4
      NA=J-((-I*5)+7)
      IJ=J
      IF(IJ.GT.60)IJ=60
      INDIV(I,NA,K)=MMAE(L,IJ,K)
  100 PINDIV(I,NA,K)=PMMAE(L,IJ,K)
      DO 105 K=1,2
      INDIV(1,1,K)=MMAE(1,3,K)
      INDIV(1,2,K)=MMAE(1,4,K)
      PINDIV(1,1,K)=PMMAE(1,3,K)
  105 PINDIV(1,2,K)=PMMAE(1,4,K)
      DO 192 NR=1,9
      DO 108 K=1,2
      DO 108 I=NR-10,NR+1
  108 SUM(I,K)=0.
      DO 110 I=NR-10,NR+1
      YRSPRT(I)=LASTYR(NR+1)-FRSTYR(I)
      IF(YRSPRT(I).LT.0)YRSPRT(I)=0
  110 EXPOS(I)=DRPRT*YRSPRT(I)
      DO 120 K=1,2
      DO 120 I=NR-10,NR+1
      DO 120 J=1,YRSPRT(I)
  120 SUM(I,K)=SUM(I,K)+PINDIV(I,J,K)
      CALL MIN
      DO 140 I=NR-10,NR+1
      II=I
      IF(II.LE.1)DROP(II,1)=.5*DROP(II,1)*.65
      IF(II.LE.1)DROP(II,2)=.5*DROP(II,2)*.5
      IF(II.GT.1)DROP(II,1)=.5*DROP(II,1)*PART(NR+1,1)
      IF(II.GT.1)DROP(II,2)=.5*DROP(II,2)*PART(NR+1,3)
  140 CONTINUE
C CAUTION*****DROP IS BEING OVERWRITTEN
C THIS VALUE OF .5 IN THE ABOVE CALCULATION IS TO TAKE ACCOUNT
C OF THE NIL EARNINGS OF CONTRIBUTORS AND THUS ONLY USE
C HALF THE MAXIMUM DROPOUT AMOUNT.
      DO 160 K=1,2
      DO 160 I=NR-10,NR+1
  160 TPNER(I,K)=SUM(I,K)-DROP(I,K)
      DO 170 I=NR-10,NR+1
      TEM1(I)=YRSPRT(I)*(1.-DRPRT)*(1./RETRT)
      IF(TEM1(I).LT.40.)TEM1(I)=YRSPRT(I)*(1./RETRT)
  170 CONTINUE
      DO 180 K=1,2
      DO 180 I=NR-10,NR+1
  180 RTFAC(I,K)=(TPNER(I,K)/TEM1(I))*DSDRP(I,NR)
      DO 192 K=1,2
      DO 192 I=NR-10,NR+1
      J=JJ(NR-I+2)
  192 FACTOR(NR+1,J,K)=RTFAC(I,K)
      DO 195 K=1,2
      DO 195 J=5,60,5
  195 FACTOR(1,J,K)=FACTOR(2,J,K)-(((FACTOR(2,J,K)+FACTOR(3,J,K))/2.)
     &  -FACTOR(2,J,K))
      DO 200 K=1,2
      DO 200 N=2,9
      DO 200 J=5,60,5
  200 FACTOR(N,J,K)=((FACTOR(N,J,K)+FACTOR(N+1,J,K))/2.)
      DO 203 K=1,2
      DO 203 I=-1,10
  203 TEM(I,K)=TPNER(I,K)/TEM1(I)
```

```
      DO 205 K=1,2
      DO 204 I=-1,9
  204 RTFAC(I,K)=((TEM(I,K)+TEM(I+1,K))/2.)*DSDRP(I,9)
  205 RTFAC(10,K)=TEM(10,K)*DSDRP(10,9)
      DO 208 K=1,2
      DO 208 I=-1,10
      J=JJ(11-I)
  208 FACTOR(10,J,K)=RTFAC(I,K)
      DO 210 K=1,2
      DO 210 J=5,55,5
  210 FACTOR(11,J+5,K)=FACTOR(10,J,K)
      FACTOR(11,5,1)=172.
      FACTOR(11,10,1)=643.
      FACTOR(11,5,2)=30.
      FACTOR(11,10,2)=142.
      FACTOR(11,15,1)=.3273*FACTOR(11,10,1)+.6727*FACTOR(11,20,1)
      FACTOR(11,15,2)=.2072*FACTOR(11,10,2)+.7928*FACTOR(11,20,2)
C THESE ADJUSTMENTS ARE NECESSARY TO ACCOUNT FOR THE SHORT
C RANGE PROJECTION OF DEATH BENEFIT FACTORS
      DO 220 K=1,2
      DO 220 N=1,11
      DO 220 J=5,55,5
      DO 220 M=1,4
  220 FACTOR(N,J+M,K)=M*.2*(FACTOR(N,J+5,K)-FACTOR(N,J,K))+FACTOR(N,
     &  J,K)
      DO 230 J=3,60
  230 ESC1(J)=((((YMPE(J)+YMPE(J-1)+YMPE(J-2))/(3./RETRT))/
     &  (PNIND(J)/100.))/1250.)
      DO 235 J=3,60
  235 ESC2(J)=(((YMPE(J)+YMPE(J-1)+YMPE(J-2))/(3./RETRT))/1250.)
      DO 240 K=1,2
      DO 240 J=11,60
  240 FACTOR(11,J,K)=FACTOR(11,J,K)*ESC1(J-5)
      DO 250 K=1,2
      DO 250 N=12,15
      DO 250 J=5,55
  250 FACTOR(N,J+5,K)=FACTOR(N-1,J,K)
      DO 260 J=11,60
      FACTOR(10,J-5,1)=FACTOR(11,J,1)
  260 FACTOR(10,J-5,2)=FACTOR(11,J,2)
      DO 270 J=56,60
      FACTOR(10,J,1)=FACTOR(10,J,1)*ESC1(J)
  270 FACTOR(10,J,2)=FACTOR(10,J,2)*ESC1(J)
      WRITE(29,41) (((FACTOR(N,J,K),J=1,60),N=1,15),K=1,2)
      DO 310 K=1,2
      DO 310 I=1,15
      DO 280 J=5,9
  280 NMDTH(I,J,K)=(1.-SURVRT(I,2,K))*POP(I+4,J,K)*FACTOR(I,J,K)
      DO 285 J=10,14
  285 NMDTH(I,J,K)=(1.-SURVRT(I,3,K))*POP(I+4,J,K)*FACTOR(I,J,K)
      DO 290 J=15,19
  290 NMDTH(I,J,K)=(1.-SURVRT(I,4,K))*POP(I+4,J,K)*FACTOR(I,J,K)
      DO 295 J=20,24
  295 NMDTH(I,J,K)=(1.-SURVRT(I,5,K))*POP(I+4,J,K)*FACTOR(I,J,K)
      DO 300 J=25,29
  300 NMDTH(I,J,K)=(1.-SURVRT(I,6,K))*POP(I+4,J,K)*FACTOR(I,J,K)
      DO 305 J=30,34
  305 NMDTH(I,J,K)=(1.-SURVRT(I,7,K))*POP(I+4,J,K)*FACTOR(I,J,K)
      DO 310 J=35,60
  310 NMDTH(I,J,K)=(1.-SURVRT(I,8,K))*POP(I+4,J,K)*FACTOR(I,J,K)
      DO 315 K=1,2
      DO 315 J=5,60
      DO 315 I=1,9
  315 DTHCS1(J,K)=DTHCS1(J,K)+NMDTH(I,J,K)
      DO 320 K=1,2
      DO 320 J=1,60
  320 DTHCS1(J,K)=DTHCS1(J,K)*ESC2(J)
      DO 325 K=1,2
      DO 325 J=5,60
      DO 325 I=10,15
  325 DTHCS2(J,K)=DTHCS2(J,K)+NMDTH(I,J,K)
```

```
  DO 330 K=1,2
  DO 330 J=1,60
330 DTHCS2(J,K)=DTHCS2(J,K)*(PNIND(J)/100.)
  DO 335 K=1,2
  DO 335 J=1,60
335 DTHCS1(J,K)=(DTHCS1(J,K)+DTHCS2(J,K))*.5
  DO 341 J=1,60
341 DTHCS1(J,1)=(1.-DREDC(J))*DTHCS1(J,1)
  DO 345 J=1,60
  YR(J)=1965+J
345 DTHCS1(J,3)=DTHCS1(J,1)+DTHCS1(J,2)
  IF(OUT.EQ.'DA')GO TO 348
  WRITE(27,10) FNAME
10 FORMAT(' DEATH BENEFIT COSTS UNDER PLAN ',A5,'  ($000''S)')
  WRITE(27,13)
  WRITE(27,14)
  DO 347 J=5,60
347 WRITE(27,17) YR(J),(DTHCS1(J,K),K=1,3)
  GO TO 999
348 WRITE(27,999) (DTHCS1(J,3),J=5,60)
999 FORMAT(5(3PF14.0))
  DO 1208 K=1,2
  DO 1208 I=-1,10
  J=JJ(11-I)
1208 FACTOR(10,J,K)=RTFAC(I,K)
  DO 1210 K=1,2
  DO 1210 J=5,55,5
1210 FACTOR(11,J+5,K)=FACTOR(10,J,K)
  FACTOR(10,10,1)=241.
  FACTOR(10,10,2)=95.
  FACTOR(11,10,1)=410.
  FACTOR(11,10,2)=85.
  FACTOR(11,15,1)=.25*FACTOR(11,10,1)+.75*FACTOR(11,20,1)
  FACTOR(11,15,2)=.35*FACTOR(11,10,2)+.65*FACTOR(11,20,2)
  DO 1215 K=1,2
  DO 1215 N=10,11
  DO 1215 J=5,9
1215 FACTOR(N,J,K)=RFAC(N-9,J-4,K)
C THESE ADJUSTMENTS ARE NECESSARY TO ACCOUNT FOR THE SHORT
C RANGE PROJECTION OF RETIREMENT FACTORS
  DO 1220 K=1,2
  DO 1220 N=10,11
  DO 1220 J=10,55,5
  DO 1220 M=1,4
1220 FACTOR(N,J+M,K)=M*.2*(FACTOR(N,J+5,K)-FACTOR(N,J,K))+FACTOR(N,
     &  J,K)
  DO 1240 K=1,2
  DO 1240 J=11,60
1240 FACTOR(11,J,K)=FACTOR(11,J,K)*ESC1(J-5)
  DO 1250 K=1,2
  DO 1250 N=12,15
  DO 1250 J=5,55
1250 FACTOR(N,J+5,K)=FACTOR(N-1,J,K)
  DO 1260 K=1,2
  DO 1260 J=11,60
1260 FACTOR(10,J,K)=FACTOR(10,J,K)*ESC1(J)
  IF(ERNTST.EQ.'NO')GO TO 357
  DO 355 J=11,60
  FACTOR(10,J,1)=.5*FACTOR(10,J,1)
355 FACTOR(10,J,2)=.75*FACTOR(10,J,2)
C THE .5 AND .75 IN THE PREVIOUS STATEMENTS ALLOW FOR THE EARNINGS
C TEST BETWEEN THE AGES OF 65-69, AND BY OMITTING THIS
C DO-LOOP, THE EARNINGS TEST IS NEGATED
357 DO 365 K=1,2
  DO 360 N=10,15
  DO 360 J=1,60
360 FACTOR(N,J,K)=FACTOR(N,J,K)*POP(N+4,J,K)*(PNIND(J)/100.)
C CAUTION****MATRIX FACTOR IS BEING PARTIALLY OVERWRITTEN
  DO 365 J=1,60
  DO 365 I=10,15
```

```
365 RTCST(J,K)=RTCST(J,K)+FACTOR(I,J,K)
 DO 370 J=1,60
370 RTCST(J,3)=RTCST(J,1)+RTCST(J,2)
 DO 375 K=1,3
 DO 375 J=1,10
375 RTCST(J,K)=.98052*RTCST(J,K)
C THIS IS AN ADJUSTMENT FOR THE SHORT TERM FOUND ON SHEET F100-1/2
 IF(OUT.EQ.'DA')GO TO 381
 WRITE(28,12) FNAME
12 FORMAT(' RETIREMENT BENEFIT COSTS UNDER PLAN ',A5,' ($000''S)')
 WRITE(28,13)
13 FORMAT('    YEAR                  MALES            FEMALES
    & TOTAL')
 WRITE(28,14)
14 FORMAT('    ----                  -----            -------
    & -----')
 DO 380 J=5,60
380 WRITE(28,17) YR(J),(RTCST(J,K),K=1,3)
 GO TO 998
381 WRITE(28,998) (RTCST(J,3),J=5,60)
998 FORMAT(5(3PF16.0))
17 FORMAT(4X,I4,8X,F12.1,5X,F12.1,5X,F13.1)
41 FORMAT(6(F10.0))
 T=CLOCK(0,0)*60.
       TYPE 421,FILE(IK+10),FILE(IK+15),FILE(IK+20),T

421    FORMAT(//,' END OF RUN',//,' OUTPUT FILES ARE: ',3(A5,'.DAT,
    &  ')//,' EXECUTION TIME = ',F8.3,' SECONDS',///)

42 FORMAT(6(F10.4,1X))
 STOP
 END


 SUBROUTINE MIN
C
C THIS SUBROUTINE CALCULATES THE EARNINGS DROPPED OUT
C TO FIND TOTAL PENSIONABLE EARNINGS
C
 COMMON /IODATA/INDIV(-12/11,47,2),EXPOS(-12/11),DROP(-12/11,2),
    & NR,DRPRT
 REAL DUP(-12/11,47,2)
 DO 195 K=1,2
 DO 195 J=1,47
 DO 195 I=-12,11
 DROP(I,K)=0.
195 DUP(I,J,K)=INDIV(I,J,K)
 DO 230 K=1,2
 IF(K.EQ.2.AND.DRPRT.LE..25)GO TO 230
C THIS CONTROL IS USED TO DROP OUT EARNINGS FOR FEMALES IF THE
C DROP OUT RATE EXCEEDS 25%
 DO 230 I=NR-10,NR+1
 II=I
 NB=EXPOS(II)/DRPRT
 IF(NR.EQ.9.AND.NB.LT.10)GO TO 230
 LL=(IFIX(EXPOS(II)))+1
 DO 220 L=1,LL
 JCNT=1
 DO 210 J=2,NB
 SMALL=DUP(II,JCNT,K)
 IF(DUP(II,J,K).LT.SMALL)GO TO 200
 GO TO 210
200 JCNT=J
 SMALL=DUP(II,J,K)
210 CONTINUE
 DUP(II,JCNT,K)=DUP(II,JCNT,K)+5000.
220 DROP(II,K)=DROP(II,K)+SMALL
 DROP(II,K)=DROP(II,K)-((1.-(EXPOS(II)-(IFIX(EXPOS(II)))))*SMALL)
230 CONTINUE
 RETURN
 END
```

```
C VERSION AS OF 12:00 AUGUST 11,1972
C PROGRAMME CONT.5.THIS IS THE FIFTH PROGRAMME IN THE CPP PROGRAMMES
C CONT.5 CALCULATES THE CONTRIBUTIONS TO THE CANADA PENSION PLAN FROM
C 1966 TO 2025 UNDER VARIOUS USER SPECIFIED OPTIONS.THESE OPTIONS
C INCLUDE REASONABLE STABILITY AND MODERATE INFLATION UNDER THE CUR-
C RENT AND PROPOSED SCHEMES.
C PROGRAMME WRITTEN BY T.LETT AND G.JACOBS FOR THE TAXATION AND
C FISCAL POLICY BRANCH MARCH 1972.
C

  DOUBLE PRECISION POP(19,60,2),TEMP(11,60,2)
  REAL YMPE(60),YBE(60),MMAE(11,60,2),ETADJ(60),
     + PART(11,10),ADJ(60),FILE(15),T(11,7),CONRTE(60)
  INTEGER YEAR(60)
C
C YMPE AND YBE ARE SELF EXPLANATORY.POP CONTAINS THE DATA GEN-
C RATED BY PROGRAMME POP.1.USERS SHOULD BE CAUTIONED THAT THIS ARRAY
C IS OVERWRITTEN SEVERAL TIMES DURING CONTRIBUTION CALCULATIONS AS
C IS THE TEMP ARRAY TO CONSERVE CORE.THE TEMP ARRAY IS FOR TEMPORARY
C COMPUTATIONAL USAGE ONLY.THE MMAE ARRAY IS THE OUTPUT FROM PROG-
C RAMME MMAE.3.THE ARRAY PART CONTAINS TEN SETS OF ELEVEN EACH OF
C PARTICIPATION RATES FOR THE LABOUR FORCE.TWO SETS ARE FOR MALES
C AND THE REMAINING EIGHT ARE FOR FEMALES.THE VECTOR ADJ CONTAINS
C ADJUSTMENT FACTORS(NOT THE SAME AS IN MMAE.3) WHICH ARE FOUND ON
C WORKSHEET E108-5 .THE VECTOR FILE CONTAINS THE VARIOUS PROGRAMME OPTION
C CODES.TXFPB IS A TAXATION AND FISCAL POLICY OPTION THAT IS SPECIF-
C IED BEFOREHAND IN OTHER PROGRAMMES.THE ARRAY T CONTAINS THE NEC-
C ESSARY COMPONENTS FOR PRINTING OUT TITLES.THE VECTOR ETADJ CONTAINS
C THE EARNINGS TEST ADJUSTMENT FACTORS.THESE ARE FOUND ON
C WORKSHHEET E108-1.
C
        DATA ETADJ/7*1.,.933,.867,.8,.68,.56,.44,.32,46*.2/
  DATA PART/.65,3*1.,3*.93,2*.87,.78,.53,.68,3*1.,3*.94,2*.88,
     + .79,.54,.46,.66,.44,6*.36,.25,.13,.5,.69,.5,6*.42,.29,.13,.55,
     +  .73,.57,6*.48,.34,.14,.58,.75,.58,6*.49,.35,.14,.46,.66,.44,

     +  6*.36,.25,.13,.49,.68,.5,6*.41,.29,.13,.53,.71,.56,6*.47,
     +  .33,.14,.55,.73,.57,6*.48,.34,.14/
        DATA ADJ/
     +  5*.1,.096,.092,.083,.074,.065,.056,.052,.048,.044,46*.04/
   DATA((T(I,J),J=1,7),I=1,11)/
     +          'REASO','NABLE',' STAB','ILITY',' CURR','ENT P','LAN  ',
     +           'MODER','ATE I','NFLAT','ION C','URREN','T PLA','N    ',
     +           'REASO','NABLE',' STAB','ILITY',' PROP','OSED ','PLAN ',
     +           'MODER','ATE I','NFLAT','ION P','ROPOS','ED PL','AN   ',
     +           'USER ','SPECI','FIED ','OPTIO','N',' ',' ',
     +           'YBE  ','EQUAL','S FLA','T RAT','E OF ','$ ',' ',
     +           'YBE  ','PROPO','RTION',' OF Y','MPE I','S ',' ',
     +           'YEAR ','CONTR','IBUTI','ONS ','TOTAL','GRWTH',' ',
     +           'MALES','FEMAL','ES   ',' ',' ',' ',' ',
     +           '-----','---  ','--   ',' IN  ',' ',' ',' ',
     +          'TOTAL',' CONT','RIBUT','ION R','ATE E','QUALS',' '/

  DATA FILE/'RSCUR','MICUR','RSPRO','MIPRO','TAFPB','MMRSC','MMMIC'
     +,'MMRSP','MMMIP','MMTFP','RSCCN','MICCN','RSPCN','MIPCN','TFPCN'/
  DATA N/1/
102 TYPE100
100 FORMAT(' TYPE IN PLAN TO BE TESTED: ',$)
  ACCEPT2,FNAME
2 FORMAT(A5)
  DO 3 IK=1,5
3 IF(FNAME.EQ.FILE(IK)) GO TO 4
  TYPE103,FNAME
103 FORMAT(1X,A5,'?, TRY AGAIN'/)
  GO TO 102
C
C DATA FILE OPSHN CONTAINS THE OPTIONS THAT CAN TESTED.X1YBE IS THE
C FLAT RATE OPTION FOR THE YBE.NOTE THAT IT IS NECESSARY TO LEAVE
C THIS VALUE AT 600. IF THE USER IS TESTING A PROPORTIONAL VALUE FOR
```

```
C FOR THE YBE.KX1 IS A SWITCH WHICH ALLOWS THE USER TO USE THE FLAT
C RATE WITH ANY OF THE CURRENT OR PROPOSED SCHEMES.THE USER SHOULD
C REFER TO STATEMENT NO. 999 TO SEE THE MECHANICS OF THIS SWITCH.
C NOTE THAT THE SWITCH MUST CONFORM WITH THE STRUCTURE
C OF THE VECTOR FILE.X2YBE IS THE OPTION WHICH ALLOWS THE YBE TO
C EXPRESSED AS A PROPORTION OF THE YMPE.IF THE FLAT RATE OPTION IS
C BEING USED X2YBE MUST BE .12.CONRTE IS THE TOTAL CONTRIBUTION
C RATE(EMPLOYER PLUS EMPLOYEE) AND MUST BE EXPRESSED AS A DECIMAL,
C IE .036.
C
4 CALL IFILE(20,FILE(IK+5))
  CALL IFILE(21,FNAME)
  CALL IFILE(22,'ONE')
  CALL IFILE(23,'OPSHN')
  READ(20,5)(((MMAE(I,J,K),J=1,60),I=1,11),K=1,2)
  READ(21,6)(YMPE(I),I=1,60)
  READ(22,6)(((POP(I,J,K),J=1,60),I=1,13),K=1,2)
  READ(23,5) X1YBE,KX1,X2YBE
  READ(23,6)(CONRTE(J),J=1,60)
5 FORMAT(5G)
6 FORMAT(10G)
7 FORMAT(9G)
999 IF(FNAME.EQ.FILE(KX1).OR.FNAME.EQ.FILE(KX1+1)) GO TO 91
  DO 8 I=1,60
8 YBE(I)=X1YBE
  GO TO 10
91 DO 9 I=1,60
9  YBE(I)=(IFIX(X2YBE*YMPE(I)+1)/100)*100
C
C THIS SECTION FIRST CALCULATES THE PARTICIPATING POPULATION AND
C THEN COPIES IT INTO TEMP FOR LATER USE.THE PARTICIPATING POPUL-
C ATION FIGURES STORED IN POP ARE SUBSEQUENTLY MULTIPLIED BY
C MODIFIED MODIFIED AVERAGE EARNINGS TO OBTAIN AGE GROUPED EARNINGS
C FOR THE WORKING POPULATION.
C
  GO TO (51,52,51,52,53),IK
51 IMI=4
  GO TO 56
52 IMI=0
  GO TO 56
53 TYPE54
54 FORMAT(1X,'ECONOMIC ASSUMPTIONS-MI/RS?',$)
  ACCEPT55,ANS
55 FORMAT(A2)
  IF(ANS.EQ.MI) GO TO 52
  GO TO 51
56 JJ=0
10 DO 101 K=1,2
  DO 11 I=1,11
  DO 11 J=1,60
  N=1
  IF(K.EQ.1.AND.J.GE.20) N=2
  IF(K.EQ.2.AND.J.GE.1) N=3
  IF(K.EQ.2.AND.J.GE.10) N=4
  IF(K.EQ.2.AND.J.GE.20) N=5
  IF(K.EQ.2.AND.J.GE.40) N=6
  POP(I,J,K)=POP(I+3,J,K)*PART(I,JJ+N)
  TEMP(I,J,K)=POP(I,J,K)
11 POP(I,J,K)=POP(I,J,K)*MMAE(I,J,K)
101 JJ=JJ+IMI
C
C THE FIRST AGE GROUP IS SCALED BY .39 BEFORE THE YEAR 2000 AND
C BY .4 AFTER THAT DATE.THIS OPERATION COMPENSATES FOR THE FACT THAT
C THIS AGE GROUP CONTAINS INDIVIDUALS FROM 15 TO 19 IN ACE WHILE
C CONTRIBUTIONS TO THE CPP DO NOT START UNTIL AGE 18.
C
   DO 14 K=1,2
  DO 14 J=1,60
  IF(J.GE.34) GO TO 120
  POP(1,J,K)=POP(1,J,K)*.39
```

```
  GO TO 14
120 POP(1,J,K)=POP(1,J,K)*.4
14 CONTINUE
C
C AT THIS POINT THE GROUPED EARNINGS ARE TOTALLED BY YEAR AND
C MULTIPLIED BY AN INDEX TO REFLECT THE GROWTH IN THE YMPE THRU
C TIME.THE TEMP ARRAY IS ALSO TOTALLED.THE CONSTANT 5000 IS THE BASE
C YEAR(1966) YMPE.
C
  DO 15 K=1,2
  DO 15 J=1,60
  POP(11,J,K)=POP(11,J,K)*ETADJ(J)
  DO 15 I=2,11
  POP(1,J,K)=POP(1,J,K)+(POP(I,J,K)*(YMPE(J)/5000))
15 TEMP(1,J,K)=TEMP(1,J,K)+TEMP(I,J,K)
C
C IN THE NEXT SECTION 1 IS ADDED TO THE ADJUSTMENT FACTOR SO THAT
C IT SCALES THE DATA OVER 100%.THE YBE IS THEN MULTIPLIED BY THE
C PARTICIPATING POPULATION AND THEN IS SUBTRACTED FROM THE TOTAL
C EARNINGS TO ELIMINATE THE TOTAL EXEMPTIONS FROM EARNINGS.
C TOTAL EARNINGS ARE THEN ADJUSTED AND MULTIPLIED BY THE CONTRB-
C UTION RATE TO GET TOTAL CONTRIBUTIONS.
C
  DO 60 J=1,60
60 ADJ(J)=ADJ(J)+1.
  DO 16 K=1,2
  DO 16 J=1,60
16 POP(1,J,K)=(POP(1,J,K)-(YBE(J)*TEMP(1,J,K)))*ADJ(J)*CONRTE(J)
  DO 13 K=1,2
  DO 13 J=1,60
  YEAR(J)=1965+J
13 TEMP(1,J,K)=0.
C
C CONTRIBUTIONS FOR MALES AND FEMALES ARE TOTALLED INTO TEMP
C FOR PRINTING PURPOSES.THE SECOND DIMENSION OF TEMP CONTAINS
C THE GROWTH RATE OF TOTAL CONTRIBUTIONS.
C
  DO 18 K=1,2
  DO 18 J=1,60
18 TEMP(1,J,1)=TEMP(1,J,1)+POP(1,J,K)
  DO 19 J=1,60
  L=J+1
  IF(L.EQ.61) GO TO 19
  TEMP(1,L,2)=((TEMP(1,L,1)-TEMP(1,J,1))/TEMP(1,J,1))*100.
19 CONTINUE
  TYPE32
32 FORMAT(1X,'OUTPUT? (TABLE/DATA):',$)
  ACCEPT50,ANS
  IF(ANS.EQ.'DA') GO TO 33
C
C THE FOLLOWING STATEMENT SCALES X2YBE TO A WHOLE NUMBER TO
C ACCOUNT FOR THE INEXACT OCTAL CONVERSION THAT TAKES PLACE IF
C IT IS LEFT AS A DECIMAL FRACTION.THIS OPERATION IS NECESSARY SO
C THAT THE LOGICAL COMPARISONS WILL WORK.
C
  X2YBE=X2YBE*100.
  IF(X1YBE.EQ.600.) IJ=7
  IF(X2YBE.EQ.12.) IJ=6
  IF(X1YBE.EQ.600..AND.KX1.EQ.1.AND.X2YBE.EQ.12.) GO TO (24,24,

     + 25,25,28),IK
  IF(IJ-6)22,22,23
22 XYBE=X1YBE
  GO TO 28
23 XYBE=X2YBE/100.
  GO TO 28
24 XYBE=X2YBE/100.
  IJ=7
  GO TO 28
25 XYBE=X1YBE
```

```
     IJ=6
     GO TO 28
  26 XYBE=X1YBE
     IJ=6
     TYPE27,XYBE
  27 FORMAT(' *** WARNING YBE HAS BEEN SET TO',F6.2,'***')

  28 CALL OFILE(24,'CONT')
     CALL TIME(XTIME)
     CALL TDATE(LD,LM,LY)
     WRITE(24,21) LD,LM,LY,XTIME
  21 FORMAT('1',50X,'DATE OF RUN'1X,2(I2,'/'),I2,2X,'TIME 'A5)
     WRITE(24,17)(T(IK,I),I=1,7),(T(IJ,I),I=1,6),XYBE,(T(8,I),
       + I=1,4),(T(8,I),I=2,6),T(10,4),(T(9,I),I=1,3),T(8,5),T(10,1),
       + T(10,1),T(10,1),T(10,2),T(10,1),T(10,1),T(10,2),T(10,1),T(10,1)
  17 FORMAT(' ',50X7A5//'0',50X6A5,F7.2,///'0',40X,A5,3X,
       + 2(3A5,2X),4XA5,6X,2A5/' ',52XA5,11X2A5,21XA5/' ',40X,
       + A5,3X2(3A5,1X),6XA5,8XA5)
     DO 29 J=1,60
     WRITE(24,1)CONRTE(J),YEAR(J),POP(1,J,1),POP(1,J,2),TEMP(1,J,1)
       + ,TEMP(1,J,2)
  29 CONTINUE
  1 FORMAT('0',33X,2PF3.1,'%'3XI4,3X3PF13.0,2(4X3PF13.0),5X0PF5.2)
  50 FORMAT(A2)
  33 IF(ANS.EQ.'TA') STOP
     CALL OFILE(25,FILE(IK+10))
     WRITE(25,31)(TEMP(1,J,1),J=1,60)
  31 FORMAT(' ',5(3PF14.0,1X))
     TYPE34,FILE(IK+10)
  34 FORMAT(1X,'OUTPUT FILE IS ',A5,'.DAT')
     STOP
     END
```

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C VERSION AS OF AUGUST 11,1972
C PROGRAMME WIDOW.6
C   WRITTEN BY HARRY NEWTON.   APRIL 1972.
      COMMON/BLOCK1/PWEWB(58,10),MAXPEN(96)
      COMMON/BLOCK2/COEFF(58,10),STOTAL(16)
      REAL MAXPEN
      DIMENSION SURVIV(7,16,2),RMARRY(5,10,2)
      DIMENSION POP(19,60),SURVM(8,15),FAC68(10)
      DIMENSION YMPE(60),PNIND(60),ESC1(58),DTHFC(15,60),FFAC(58)
      DIMENSION FNAME(5),FOUT(5),DNAME(5)
      DIMENSION LIMIT1(4),LIMIT2(7),OAS(3),ERPCTU(3),ERPCTO(3)
      DIMENSION PRPMRD(15,5),AGEDIS(15,6),NHAGRP(15),NWAGRP(15)
      DIMENSION ESCDBF(15),DEATHS(15),ZERO(944)
      DIMENSION ERBU65(58),ERBO65(58),FRBU65(58)
      DATA ERBU65,ERBO65,FRBU65/174*0./,IKOUNT/5/
      DATA FAC68/600.,793.,881.,864.,2*855.,832.,785.,699.,405./
      DATA FFAC/5*0.,23.,32.,41.,64.,88.,111.,135.,158.,181.,204.,228.,
     * 251.,41*0./
      DATA OAS/300.,960.,0./,ERPCTU/.375,.75,0./,ERPCTO/.6,.75,0./
      DATA FNAME/'RSCUR','MICUR','RSPRO','MIPRO','TXFPB'/
      DATA DNAME/'DHRSC','DHMIC','DHRSP','DHMIP','DHTFP'/
      DATA  FOUT/'RSCWD','MICWD','RSPWD','MIPWD','TFPWD'/
      DATA NHAGRP/3,4,4,5,5,9*6,5/
      DATA NWAGRP/1,1,2,2,3,3,4,5,6,7,8,9,10,11,12/
      DATA LIMIT1/1971,1981,1991,2001/
      DATA LIMIT2/1970,1975,1980,1985,1990,1995,2000/
      DATA ((PRPMRD(I,J),J=1,5),I=1,15)/5*.3,5*.7,5*.82,5*.86,9*.88,.89,
     1  2*.87,3*.88,.84,2*.85,2*.86,.82,.83,.84,2*.85,.8,.81,.82,.83,
     2  .84,.74,.76,.78,.8,.81,.67,.7,.72,.74,.76,.55,.58,.6,.62,.64,.43
     3  ,.46,.48,.5,.52,.31,.34,.36,.38,.4/
      DATA ((AGEDIS(I,J),J=1,6),I=1,15)/.22,.69,.09,3*0.,.03,.4,.49,.08,
     2  2*0.,.09,.39,.43,.09,2*0.,.02,.1,.38,.42,.08,0.,.03,.13,.4,.36,
     3  .08,0.,.01,.04,.16,.38,.34,.07,.02,.05,.17,.38,.32,.06,.03,.06,
     4  .18,.37,.3,.06,.03,.07,.19,.35,.29,.07,.05,.07,.19,.34,.28,.07,
     5  .06,.07,.2,.34,.27,.06,.07,.07,.21,.35,.25,.05,.08,.08,.23,.36,
     6  .22,.03,.1,.1,.26,.35,.17,.02,.13,.13,.3,.32,.12,0./
      EQUIVALENCE (COEFF(1,1),ZERO(1))
      CALL CLOCK1
   34 TYPE 2001
 2001 FORMAT(//,' TYPE IN PLAN TO BE TESTED - ',$)
      ACCEPT 2002,PLAN
 2002 FORMAT(A5)
      DO 40 J=1,5
      IF(PLAN.EQ.FNAME(J)) GO TO 41
   40 CONTINUE
      TYPE 2003,PLAN
 2003 FORMAT(//,' ***ERROR***  NO PLAN CALLED ',A5)
      GO TO 34
   41 KFILE=J
      CALL IFILE(28,PLAN)
C   READ IN MAXIMUM PENSIONABLE EARNINGS FOR EACH YEAR(YMPE).
      READ(28,2004) (YMPE(J),J=1,60)
      GO TO (43,44,43,44,45),KFILE
   45 TYPE 2005
 2005 FORMAT(' TYPE IN GROWTH RATE FOR AVERAGE EARNINGS AFTER 1975',
     *  /,3X,'(I.E., FOR 5.5%, TYPE 1.055) === ',$)
      ACCEPT 2004,RATE
      CALL IFILE(27,'TFPNX')
      GO TO 46
   43 CALL IFILE(27,'RSPNX')
      RATE=1.035
      GO TO 46
   44 CALL IFILE(27,'MIPNX')
      RATE=1.055
   46 READ(27,2004) (PNIND(J),J=1,60)
C   CALCULATE MAXIMUM PENSION FOR EACH YEAR (MAXPEN).
      DO 42 J=1,58
   42 MAXPEN(J)=(YMPE(J)+YMPE(J+1)+YMPE(J+2))*100./(12.*PNIND(J+2))
      DO 39 J=59,96
   39 MAXPEN(J)=MAXPEN(J-1)*RATE
```

```
      TYPE 1006
 1006 FORMAT(' TYPE IN RETIREMENT PENSION RATE (0-1) -- ',$)
      ACCEPT 2004, RETRT
C   CALCULATE ESCALATION COEFFICIENTS.
      DO 47 J=1,58
   47 ESC1(J)=RETRT*(YMPE(J)+YMPE(J+1)+YMPE(J+2))/(PNIND(J+2)*37.5)
      CALL IFILE(29,'ONE')
      READ(29,2004) ((POP(I,J),J=1,60),I=1,19)
      CALL IFILE(29,'SURVM')
      READ(29,2010) ((SURVM(I,J),I=1,8),J=1,15)
 2010 FORMAT(8G)
      CALL IFILE(29,DNAME(KFILE))
      READ(29,2008) ((DTHFC(K,L),L=1,60),K=1,15)
 2008 FORMAT(6G)
C   MALE DEATH BENEFIT FACTORS FOR 1968-9 ARE NOT COMPUTED IN THE
C   PROGRAM 'RETBN.4'.  HENCE, THE VALUES SUPPLIED BY THE DEPT. OF
C   INSURANCE, OTTAWA ARE INSERTED.
      DO 51 K=1,10
      DTHFC(K,3)=FAC68(K)
   51 DTHFC(K,4)=FAC68(K)+(DTHFC(K,5)-FAC68(K))/2.
C
C   IN THIS SECTION, THE FEMALE DEATH BENEFIT FACTORS COMPUTED IN THE
C   PROGRAM 'RETBN.4' ARE ADJUSTED IN THE SHORT TERM FOR THE PURPOSE OF
C   COMPUTING REDUCTION FACTORS AT A LATER STAGE IN THIS PROGRAM.
C   SINCE THE FEMALE DEATH BENEFIT FACTORS ARE ALMOST IDENTICAL IN THE
C   SHORT TERM FOR BOTH REASONABLE STABILITY AND MODERATE INFLATION,
C   THE PROGRAM DOES NOT DISTINGUISH BETWEEN THESE TWO TYPES OF SCHEMES
C   WHEN ADJUSTING THE FACTORS.
      DO 48 K=1,11
   48 READ(29,2008) (ZERO(L),L=1,19),(FFAC(L),L=18,58)
      DO 49 K=8,17
   49 FFAC(K)=FFAC(K)*ESC1(K-7)
      DO 50 K=18,58
   50 FFAC(K)=FFAC(K)*ESC1(K-7)/ESC1(K-5)
      CALL IFILE(29,'REMAR')
      READ(29,2004) (((RMARRY(K,L,M),L=1,10),K=1,5),M=1,2)
 2004 FORMAT(10G)
      CALL IFILE(29,'SURVP')
      READ(29,1002) (((SURVIV(K,L,M),L=1,16),K=1,7),M=1,2)
 1002 FORMAT(16F4.3)
      CALL IFILE(29,'PWEWB')
      READ(29,1003) ((PWEWB(K,L),L=1,10),K=1,58)
 1003 FORMAT(5X,10F5.4)
      TYPE 1001
 1001 FORMAT(' TYPE IN STARTING YEAR (DEFAULT IS 1968) - ',$)
      ACCEPT 2004,IYRST
      IF(IYRST.LT.1968.OR.IYRST.GT.2025) IYRST=1968
      TYPE 1004
 1004 FORMAT(' TYPE IN PROPOSED ANNUAL FLAT RATE PAYMENT, AND THE',
     * /,6X,'YEAR IT BEGINS --- ',$)
      ACCEPT 2004,OAS(3),IFR
      IFR=IFR-1967
      OAS(2)=100.*OAS(2)/PNIND(8)
      OAS(3)=100.*OAS(3)/PNIND(IFR+2)
      TYPE 1005
 1005 FORMAT(' TYPE IN PERCENTAGE (BETWEEN 0 AND 1) OF BENEFIT THAT '
     * 'IS EARNINGS',/,5X,' RELATED (1) FOR WIDOWS UNDER 65 --- ',$)
      ACCEPT 2004,ERPCTU(3)
      TYPE 1008
 1008 FORMAT(14X,'(2) FOR WIDOWS 65 AND OVER --- ',$)
      ACCEPT 2004,ERPCTO(3)
      TYPE 1009
 1009 FORMAT(14X,'BEGINNING IN THE YEAR ',$)
      ACCEPT 2004,IER
      IER=IER-1967
      DO 100 IYR=IYRST,2025
      DO 1 J=1,4
      IF(IYR.LT.LIMIT1(J)) GO TO 2
    1 CONTINUE
      J=5
```

```
    2 IX=J
      DO 3 I=1,944
    3 ZERO(I)=0.
      NX=10+(IYR-1965)/5
      NX=MIN0(NX,15)
      IYEAR=IYR-1967
      LXO=(IYEAR+7)/5
      DO 38 J=1,7
      IF(IYR.LT.LIMIT2(J)) GO TO 37
   38 CONTINUE
      J=8
   37 IX1=J
      DO 35 I=1,15
   35 DEATHS(I)=(1.-SURVM(IX1,I))*POP(I+4,IYEAR+2)
      DO 7 J=1,9
    7 ESCDBF(J)=ESC1(IYEAR)*DTHFC(J,IYEAR+2)
C     DEATH BENEFIT FACTORS FOR AGE GROUPS 65+ HAVE ALREADY BEEN
C     ESCALATED IN THE PROGRAM 'RETBN.4'
      DO 12 J=10,15
   12 ESCDBF(J)=DTHFC(J,IYEAR+2)
      DO 5 I=1,NX
      NUM=NMAGRP(I)
      NST=NWAGRP(I)
      NFIN=NST+NUM-1
      DO 6 J=NST,NFIN
      TEMP=DEATHS(I)*PRPMRD(I,IX)*AGEDIS(I,J-NST+1)*1000
      COEFF(IYEAR,J)=COEFF(IYEAR,J)+TEMP
    6 STOTAL(J)=STOTAL(J)+TEMP*ESCDBF(I)
    5 CONTINUE
      DO 4 I=1,16
      TEMP=COEFF(IYEAR,I)
    4 STOTAL(I)=STOTAL(I)/AMAX1(1.,TEMP)
      M=0
      M1=0
      NST=IYR-1966
      IF(NST.GT.58) GO TO 69
      M2=1
      IF(IYR.GT.1969) M2=2
      DO 8 I=NST,58
      IF(I.NE.NST.AND.I.GT.3.AND.MOD(I+2,5).GT.0) GO TO 8
      KYR=IYR+I-NST
      DO 9 J=1,6
      IF(KYR.LE.LIMIT2(J)) GO TO 10
    9 CONTINUE
      J=7
   10 IX=J
      LX=I+6
      IF(MOD(LX,5).EQ.4.AND.LX.GT.(28+NST)) M1=M1+1
      LX=LX/5
      IF(LXO.NE.LX) M=M+(LX-LXO)
      JX=1+(1+I)/5-(NST+1)/5
      JX=MIN0(JX,5)
      DO 11 J=1,16
      IF((J+M).GT.16) GO TO 11
      JX1=MIN0(10,J+M1)
      IF((I-NST).GT.3) GO TO 13
      COEFF(I,J)=COEFF(IYEAR,J)*RMARRY(JX,JX1,M2)*SURVIV(IX,J+M,M2)
      GO TO 11
   13 COEFF(I,J)=COEFF(I-5,J)*RMARRY(JX,JX1,M2)*SURVIV(JX,J+M,M2)
   11 CONTINUE
      LXO=LX
    8 CONTINUE
      NST1=NST+1
      NST2=5-MOD(NST+2,5)
      IF(NST2.EQ.5) GO TO 62
      NST3=NST+NST2-1
      ST1=1.
      ST2=NST2+1
      DO 60 I=NST,NST3
      DO 61 J=1,16
```

```
61 COEFF(I,J)=(COEFF(NST-1,J)*(ST2-ST1)/ST2)+COEFF(NST3+1,J)*ST1/ST2
60 ST1=ST1+1.
66 NST1=NST3+2
62 IF(NST1.GT.58) GO TO 65
   ST1=1.
   DO 63 I=NST1,58
   IF(MOD(I+2,5).EQ.0) GO TO 64
   N2=3+5*((I+2)/5)
   N1=N2-5
   DO 67 J=1,16
67 COEFF(I,J)=(COEFF(N1,J)*(5.-ST1)/5.)+COEFF(N2,J)*ST1/5.
   GO TO 63
64 ST1=0.
63 ST1=ST1+1.
65 IF(IYR.GT.1968) GO TO 69
   DO 68 J=1,16
68 COEFF(2,J)=(COEFF(1,J)+COEFF(3,J))/2.
69 CONTINUE
   KX3=10+(IYEAR+2)/5
   KX3=MAX0(KX3,11)
   KX3=MIN0(KX3,16)
   DO 17 K=IYEAR,58
   JER=1
   IF(KFILE.GT.2.AND.K.GT.5) JER=2
   IF(K.GT.(IER-1)) JER=3
   JFR=1
   IF(KFILE.GT.2.AND.K.GT.5) JFR=2
   IF(K.GT.(IFR-1)) JFR=3
   H=1.
   IF(K.EQ.IYEAR) H=.5
   KX=(K+4-IYEAR)/5
   XK=1.-MOD(K-IYEAR,5)/5.
   IF(XK.GT..9) XK=0.
   KX=10-KX
   KX1=KX+1
   IF(KX) 25,25,23
23 DO 16 J=1,KX
16 ERBU65(K)=ERBU65(K)+ERPCTU(JER)*STOTAL(J)*COEFF(K,J)*H
   ERBU65(K)=ERBU65(K)+ERPCTU(JER)*STOTAL(KX1)*COEFF(KX1,J)*XK*H
25 KX1=MAX0(1,KX1)
   DO 18 J=KX1,KX3
   IYR72=60+IYEAR-5*J
   IYR72=MIN0(58,IYR72)
   IYR72=MAX0(6,IYR72)
   R=REDFAC(J,IYEAR,STOTAL(J),FFAC(IYR72))
18 ERBO65(K)=ERBO65(K)+ERPCTO(JER)*STOTAL(J)*COEFF(K,J)*R*H
   IF(KX) 17,22,26
   IF(XK.LT..1) GO TO 29
26 IYR72=60+IYEAR-5*KX1
   IYR72=MIN0(58,IYR72)
   IYR72=MAX0(6,IYR72)
   R=REDFAC(KX1,IYEAR,STOTAL(KX1),FFAC(IYR72))
   ERBO65(K)=ERBO65(K)-ERPCTO(JER)*STOTAL(KX1)*COEFF(KX1,J)*R*XK*H
29 KX4=KX3+1
   IF(KX4.GT.16) GO TO 24
   DO 19 J=KX4,16
19 ERBO65(K)=ERBO65(K)+ERPCTO(JER)*STOTAL(J)*COEFF(K,J)*H
24 DO 20 J=1,KX
   KX2=MAX0(1,J-6)
20 FRBU65(K)=FRBU65(K)+COEFF(K,J)*PWEWB(IYEAR,KX2)*OAS(JFR)*H
22 KX2=MAX0(1,KX1-6)
   IF(K.EQ.IYEAR) GO TO 17
   FRBU65(K)=FRBU65(K)+COEFF(K,KX1)*PWEWB(IYEAR,KX2)*OAS(JFR)*XK*H
17 CONTINUE
100 CONTINUE
   DO 21 I=1,58
   ERBU65(I)=(ERBU65(I)+ERBO65(I))*.009*PNIND(I+2)
21 FRBU65(I)=FRBU65(I)*.009*PNIND(I+2)
   CALL OFILE(23,FOUT(KFILE))
   WRITE(23,2010) ERBU65,FRBU65
```

```
      T=CLOCK(0,0)*60.
      TYPE 2009,FOUT(KFILE),T
 2009 FORMAT(//,' END OF RUN',//,' OUTPUT FILE IS ',A5,'.DAT',//,
     *  ' EXECUTION TIME = ',F8.3,' SECONDS',///)
      STOP
      END
C
C
C
      FUNCTION REDFAC(AGEGRP,IYR,MFAC,FFAC)
C   THIS SUBROUTINE COMPUTES REDUCTION FACTORS.
C   WRITTEN BY HARRY NEWTON.   APRIL 1972.
      COMMON/BLOCK1/PWEWB(58,10),MAXPEN(96)
      INTEGER AGEGRP,YEAR,YR65,AGE
      REAL MAXPEN,MFAC
      DIMENSION PCT(5),DIST(5),BENM(2),BENF(5),PWNRP1(11),PWNRP2(11)
      DATA PCT/.225,.125,.075,.075,0./,DIST/.225,.125,.075,.075,0./
      DATA PWNRP1/.55,.83,.78,.73,.67,.61,.54,.47,.4,.32,.15/
      DATA PWNRP2/.85,.5,.75,.69,.63,.57,.5,.43,.36,.25,.11/
    1 K1=AGEGRP-6
      K1=MAX0(K1,1)
      XMXPEN=MAXPEN(IYR)
      AVGM=MFAC/PWEWB(IYR,K1)
      IF(IYR.GT.2) GO TO 6
      PWNRP=PWNRP1(AGEGRP)
      GO TO 7
    6 IOLD=(IYR+4)/5
      IOLD=MIN0(IOLD,AGEGRP-1)
      PWNRP=PWNRP2(AGEGRP-IOLD)
    7 AVGF=FFAC/PWNRP
      AGE=10+5*AGEGRP
      IF(AGE.GT.64) GO TO 25
      IF(AVGM.GT.(.75*XMXPEN)) GO TO 24
      BENM(1)=1.25*AVGM
      GO TO 26
   24 BENM(1)=XMXPEN
   26 BENM(2)=2*(AVGM-BENM(1)/2.)
      GO TO 27
   25 BENM(2)=.75*AVGM
      BENM(1)=2*(AVGM-BENM(2)/2.)
   27 YR65=63+IYR-AGE
      IF(YR65.LT.1) YR65=1
      IF(YR65.GT.96) TYPE 28,IYR,AGE,YR65
   28 FORMAT(' YEAR =',I5,8X,'AGE =',I4,8X,'YR65 =',I5)
      YMPE65=MAXPEN(YR65)
      IF(YR65.LT.9) YMPE65=YMPE65*(FLOAT(YR65)+1.5)/10.
      BENF(2)=AVGF
      BENF(3)=1.5*AVGF
      BENF(4)=YMPE65
      IF(YMPE65.GT.(2.3*AVGF)) GO TO 31
      BENF(5)=0.
      BTOT=.25*BENF(2)+.15*BENF(3)+.15*BENF(4)
      BENF(1)=(AVGF-BTOT)/.45
      GO TO 32
   31 BENF(1)=.4*AVGF
      BTOT=.45*BENF(1)+.25*BENF(2)+.15*BENF(3)+.05*BENF(4)
      BENF(5)=10*(AVGF-BTOT)
   32 CONTINUE
      BENM(1)=.75*BENM(1)
      BENM(2)=.75*BENM(2)
      BTOT=0.
      PCT(4)=DIST(4)
      PCT(5)=DIST(5)
      IF(BENF(5).EQ.0.) GO TO 10
      PCT(4)=.025
      PCT(5)=.05
   10 YMPE65=MAXPEN(YR65)
      IF(IYR.GT.YR65) YMPE65=XMXPEN
      DO 20 J=1,5
      DO 20 I=1,2
```

```
      IF((AMAX1(BENM(I),BENF(J))+.5*AMIN1(BENM(I),BENF(J))).GT.YMPE65)
     *   GO TO 21
      IF(BENM(I).GT.BENF(J)) GO TO 22
      TEMP=BENM(I)*.5
      GO TO 23
   22 TEMP=BENM(I)-BENF(J)*.5
      GO TO 23
   21 TEMP=YMPE65-AMAX1(BENM(I),BENF(J))
      TEMP=AMAX1(0.,TEMP)
   23 BTOT=BTOT+TEMP*PCT(J)
   20 CONTINUE
      PROPBP=PWEWB(IYR,K1)*PWNRP
      PROPWP=PWEWB(IYR,K1)*(1.-PWNRP)
      TEMP=.75*AVGM
      REDFAC=(PROPBP*BTOT+PROPWP*TEMP)/(TEMP*PWEWB(IYR,K1))
      RETURN
      END
```

```
C VERSION AS OF 12:00 AUGUST 17,1972
C PROGRAMME DISBN.7.THIS PROGRAMME CALCULATES DISABILITY BENEFITS
C FOR THE CANADA PENSION PLAN. IT ALSO COMPUTES WIVES' BENEFITS AS A
C SPECIFIED OPTION.
C

  REAL POP(19,60,2),DTHFAC(15,60,2),PRVRTE(9,6,2),DISINS(4),
     + PROP(9,10),FILE(20),DISFR(9,60,2),YMPE(60),PNIND(60),
     + WIFEBN(19,60,2),OAS(3)

  REAL DISERN(9,60,2),PHWHWC(10),FACTOR(9),FMTH65(4,10)
  INTEGER YEAR(60),YR
  DATA (((PRVRTE(I,J,K),I=1,9),J=1,6),K=1,2)
     +  /.04,.1,.24,.4,.66,.96,1.78,2.88,5.,.05,.13,.35,.6,
     + .96,1.39,2.61,4.27,7.64,.05,.13,.37,.67,1.07,1.55,2.93,4.78,
     + 8.66,.05,.13,.36,.69,1.12,1.63,3.07,4.97,9.01,.05,.13,.36,.68,
     + 1.13,1.67,3.15,5.08,9.21,.05,.13,.37,.68,1.12,1.68,3.16,5.12,
     + 9.31,.05,.12,.3,.5,.82,1.17,2.19,3.54,6.14,.05,.14,.36,
     + .62,1.,1.45,2.73,4.46,8.09,.05,.14,.38,.68,1.08,1.57,2.96,4.82,
     + 8.74,.05,.14,.38,.7,1.13,1.64,3.08,4.98,9.02,.05,.14,.38,.7,
     + 1.15,1.67,3.15,5.08,9.21,.05,.14,.38,.7,1.15,1.69,3.18,5.13,9.3/
  DATA FMTH65/.49,1.365,3.605,7.35,.731,2.421,6.532,14.112,.963,
     + 3.257,9.124,19.846,1.04,3.655,10.393,23.189,1.087,3.844,
     + 11.064,24.881,1.109,3.942,11.387,25.79,1.12,3.991,11.552,
     + 26.223,1.12,4.,11.593,26.36,1.12,4.,11.6,26.392,1.12,4.,
     + 11.6,26.4/

  DATA ((PROP(I,J),I=1,9),J=1,10)
     +  /.4,3*.95,3*.9,2*.85,.4,3*.95,3*.91,2*.86,.2,.45,.4,
     + 5*.35,.3,.21,.52,.47,5*.42,.36,.23,.6,.54,5*.49,.43,.24,.61,
     + .55,5*.5,.44,.2,.45,.4,5*.35,.30,.21,.52,.47,5*.41,.36,.22,
     + .59,.53,5*.48,.42,.23,.6,.54,5*.49,.43/
  DATA PHWHWC/.576,.738,.942,.947,.894,.843,.741,.558,.356,.114/
  DATA FACTOR/386.4,683.5,791.7,828.2,834.7,835.6,813.2,777.8,
     + 696.6/
  DATA OAS/300.,960.,0./
  DATA DISINS/.95,.7,.75,.8/
  DATA FILE/'RSCUR','MICUR','RSPRO','MIPRO','TXFPB','DHRSC',
     + 'DHMIC','DHRSP','DHMIP','DHTFP','DSRSC','DSMIC','DSRSP',
     + 'DSMIP','DSTFP','RSCWF','MICWF','RSPWF','MIPWF','TFPWF'/
  EQUIVALENCE(POP,WIFEBN)
101 TYPE1
1 FORMAT(' TYPE IN PLAN TO BE TESTED: '$)
  ACCEPT2,FNAME
2 FORMAT(A5)
  DO 3 IK=1,5
3 IF(FNAME.EQ.FILE(IK)) GO TO 4
  TYPE100,FNAME
100 FORMAT(1X,A5,' ?, TRY AGAIN'/)
  GO TO 101
4 CALL IFILE(20,FILE(IK+5))
  CALL IFILE(21,FNAME)
  CALL IFILE(22,'ONE')
  CALL IFILE(23,'MIPNX')
  IF(IK/2*2.NE.IK) CALL IFILE(23,'RSPNX')
  IF(IK.EQ.5)CALL IFILE(23,'TFPNX')
  CALL OFILE(24,FILE(IK+10))
  READ(20,20)(((DTHFAC(I,J,K),J=1,60),I=1,15),K=1,2)
  READ(21,5)(YMPE(J),J=1,60)
  READ(22,5)(((POP(I,J,K),J=1,60),I=1,19),K=1,2)
  READ(23,5)(PNIND(J),J=1,60)
5 FORMAT(10G)
C
C THIS SECTION SCALES THE FIRST AGE GROUP FOR THOSE 22-24 YEARS OF
C AGE.THE FLAT RATE CALCULATION BEGINS WITH MULTIPLYING THE
C DISABILITY PREVALENCE RATES BY THE CORRESPONDING POPULATION STATISTICS.
C THE CALCULTION OF THE EARNINGS RELATED PORTION IS SIMILAR BUT IT ALSO
C INCLUDES THE DEATH RATE OF THE CORESPONDING POPULATION AGE GROUPS.
C
  DO 7 K=1,2
  DO 7 I=1,9
```

```
      SCALE=1.
      IF(I.EQ.1) SCALE=.0
      DO 7 J=5,60
      N=(J-5)/5
      N=MAX0(1,N)
      N=MINO(6,N)
      YEAR(J)=YEAR(J)+1965
      DISFR(I,J,K)=POP(I+4,J,K)*PRVRTE(I,N,2)*SCALE
    7 DISERN(I,J,K)=POP(I+4,J,K)*PRVRTE(I,N,1)*SCALE*DTHFAC(I,J,K)
      IF(IK/2*2.EQ.IK) GO TO 8
      IMI=4
      GO TO 9
    8 IMI=0
    9 JJ=0
      IF(IK.EQ.5) GO TO 10
      GO TO 13
C
C IF(IK.EQ.5), THEN THE TXFPB OPTION HAS BEEN SPECIFIED AND THE
C USER MUST DECIDE WHICH PENSION INDEX HE WILL USE.THE INPUT IS
C THROUGH THE TELETYPE.
C
   10 TYPE11
   11 FORMAT(' ECONOMIC ASSUMPTIONS - (RS/MI)',$)
      ACCEPT12,ANS
   12 FORMAT(A2)
      IF(ANS.NE.'MI') IMI=4
C
C THIS SECTION MULTIPLIES THE APPROPRIATE PROPORTION INSURED
C FOR DISABILITY BY THE DISABLED CONTRIBUTOR POPULATION. THE
C RESULTS ARE PUT INTO THE MATRIX WIFEBN WHICH IS THE POPULATION
C ARRAY (NO LONCER USED AND THUS EQUIVALENCED TO WIFEBN) BECAUSE
C THE CALCULATION OF WIVES' BENEFITS IS IDENTICAL TO THAT OF THE
C FLAT RATE TO THIS POINT.
C
   13 DO 15 K=1,2
      DO 14 I=1,9
      DO 14 J=5,60
      N=1
      IF(K.EQ.1.AND.J.GE.25) N=2
      IF(K.EQ.2.AND.J.GE. 1) N=3
      IF(K.EQ.2.AND.J.GE.15) N=4
      IF(K.EQ.2.AND.J.GE.25) N=5
      IF(K.EQ.2.AND.J.GE.45) N=6
      DISFR(I,J,K)=DISFR(I,J,K)*PROP(I,JJ+N)
   14 WIFEBN(I,J,1)=DISFR(I,J,1)
   15 JJ=JJ+IMI
C
C THIS SECTION TOTALS THE EARNINGS RELATED AND FLAT RATE BENEFITS
C THE COMPUTED GO TO SETS THE APPROPRIATE FLAT RATE BENEFIT TO
C BE USED.THE USER CAN SPECIFY A NEW FLAT RATE TO BE USED IN THE
C FUTURE VIA THE TELETYPE.FOR THE YEARS PRECEDING THE NEW FLAT
C RATE THE PROGRAM DEFAULTS TO 300 OR 960 AMOUNTS DEPENDING ON THE
C BEING TESTED.IF THE USER IS TESTING A TXFPB OPTION THE PROGRAM WILL
C ASK WHICH INITIAL FLAT RATE HE WISHES TO USE.
C
      TYPE6
    6 FORMAT(' ANNUAL FLAT RATE BENEFIT AND YEAR IT BEGINS? '/)
      ACCEPT5,OAS(3),YR
      DO 16 K=1,2
      DO 16 J=5,60
      DO 16 I=2,9
      DISFR(1,J,K)=DISFR(1,J,K)+DISFR(I,J,K)
   16 DISERN(1,J,K)=DISERN(1,J,K)+DISERN(I,J,K)
      GO TO (31,31,32,32,33),IK
   31 IJ=1
      GO TO 34
   32 IJ=2
      GO TO 34
   33 TYPE35
   35 FORMAT(' FLAT RATE - (CURRENT/PROPOSED)',$)
```

```
      ACCEPT12,FR
      IF(FR.EQ.'CU') GO TO 31
      GO TO 32
   34 TYPE29
   29 FORMAT(' WIVES BENEFIT - (YES/NO):',$)
      ACCEPT12,ANS
      IL=2
      IF(ANS.EQ.'NO') IL=1
C
C THE EARNINGS RELATED PORTION IS MULTIPLIED BY THE RATE OF GROWTH
C OF RETIREMENT PENSIONS AND THE PROPORTION OF CONTRIBUTORS INSURED
C FOR DISABILITY.
C

      DO 17 K=1,2
      DO 17 J=5,60
      N=1
      JJ=1
      IF(IJ.EQ.2.AND.J.GE.8) JJ=2
      II=JJ**3
      IF(K.EQ.2.AND.J.GE. 1) N=2
      IF(K.EQ.2.AND.J.GE.15) N=3
      IF(K.EQ.2.AND.J.GE.25) N=4
      DISERN(1,J,K)=(((YMPE(J-2)+YMPE(J-1)+YMPE(J))/15000)*
     + (DISINS(N)*DISERN(1,J,K)))
      IF(J.GE.(YR-1966+1)) JJ=3
      IF(J.GE.(YR-1966+1)) II=YR-1966+1
   17 DISFR(1,J,K)=((OAS(JJ)*(PNIND(J)/PNIND(II)))*DISFR(1,J,K))
      DO 18 J=5,60
      DISERN(1,J,1)=DISERN(1,J,1)+DISERN(1,J,2)
   18 DISFR(1,J,1)=DISFR(1,J,1)+DISFR(1,J,2)
      TYPE180
  180 FORMAT(' RATIO OF IMPUTED RETIREMENT PENSION AND'/
     + ' YEAR IT BEGINS: ',$)
      ACCEPT5,BJ,YR1
      IF(IK.EQ.5) GO TO 36
      GO TO 37
   36 TYPE350
  350 FORMAT(' EARNINGS RELATED - (CURRENT/PROPOSED)',$)
      ACCEPT12,FR
      IJ=2
      IF(FR.EQ.'CU') IJ=1
C
C EARNINGS RELATED DISABILITY PENSIONS ARE SCALED BY
C THE RATIO FOR THE IMPUTED RETIREMENT PENSION.
C
   37 DO 181 J=5,60
      AJ=.75
      IF(IJ.EQ.2.AND.J.GE.8) AJ=1.
      IF(J.GE.(YR1-1966+1)) AJ=BJ
  181 DISERN(1,J,1)=DISERN(1,J,1)*AJ
      WRITE(24,19)(DISERN(1,J,1),J=5,60)
      WRITE(24,19)(DISFR(1,J,1),J=5,60)
   19 FORMAT(' ',10(1PF12.0))
   20 FORMAT(6G)
C
C THIS SECTION CALCULATES THE WIVES' BENEFITS.
C
      CALL OFILE(25,FILE(IK+15))
      GO TO (30,22),IL
C
C THIS SECTION CALCULATES THE NUMBER OF WIVES ENTITLED TO BENEFITS.
C

   22 DO 23 I=1,9
      DO 23 J=5,60
   23 WIFEBN(I,J,1)=WIFEBN(I,J,1)*FACTOR(I)
```

```
C THIS CALCULATES THE NUMBER OF WIVES OVER 65 WHO ARE
C ENTITLED TO BENEFITS UNDER THE SCHEME.
C
  DO 24 I=1,4
  DO 24 J=5,60
  N=(J-5)/5
  N=MAX0(1,N)
  N=MINO(10,N)
  WIFEBN(I,J,2)=WIFEBN(I+9,J,2)*FMTH65(I,N)
24 WIFEBN(10,J,1)=0.
C
C THE WIVES OVER 65 WHO ARE ENTITLED TO BENEFITS ARE ADDED TO THOSE
C UNDER 65 WHO RECEIVE BENEFITS.
C
  DO 25 I=1,4
  DO 25 J=5,60
25 WIFEBN(10,J,1)=WIFEBN(10,J,1)+WIFEBN(I,J,2)
  DO 250 J=5,60
250 WIFEBN(10,J,1)=WIFEBN(10,J,1)*100
C
C THIS CALCULATES THE NUMBER OF HUSBANDS AND WIVES AT HOME
C WITH CHILDREN.
C
  DO 26 I=1,10
  DO 26 J=5,60
26 WIFEBN(I,J,1)=WIFEBN(I,J,1)*PHWHWC(I)
C
C THE NUMBER OF WIVES ENTITLED TO BENEFITS IS TOTALLED AND
C COSTED AND MULTIPLIED BY THE APPROPRIATE PENSION INDEX.
C
  DO 27 I=2,10
  DO 27 J=5,60
27 WIFEBN(1,J,1)=WIFEBN(1,J,1)+WIFEBN(I,J,1)
  DO 270 J=5,60
  JJ=2
  II=8
  IF(J.GE.YR-1966+1) JJ=3
  IF(J.GE.YR-1966+1) II=YR-1966+1
270 WIFEBN(1,J,1)=WIFEBN(1,J,1)*(OAS(JJ)*(PNIND(J)/PNIND(II)))
  WRITE(25,190)(WIFEBN(1,J,1),J=5,60)
190 FORMAT(' ',10(-2PF12.0))
  GO TO 1000
30 DO 134 J=1,60
134 WIFEBN(1,J,1)=0.0
  WRITE(25,190) (WIFEBN(1,J,1),J=1,60)
1000 TYPE40,FILE(IK+10),FILE(IK+15)
40 FORMAT(' OUTPUT FILES ARE ',A5,'.DAT AND ',A5,'.DAT'/)
  STOP
  END
```

```
C VERSION AS OF 12:00 AUGUST 11,1972
C PROGRAMME CHILD.8.THIS PROGRAMME CALCULATES BENEFITS
C FOR ORPHANS AND CHILDREN OF DISABLED CONTRIBUTORS.
C
  DIMENSION DUMMY(10)
  REAL POP(4,60,2),PROB(4,13),ADJ(5),PNIND(60),SDFIFD(4,6),
     + FILE(10),PROB1(4,58),ORPHBN(4,58,2),CHLDBN(4,58,2),PROB2(4,58)
  INTEGER YEAR(60),YR
  DATA ((PROB(I,J),J=1,13),I=1,4)
     +  /.105,.425,.528,.517,.486,.468,.437,.423,.403,.4,
     + .399,.395,.401,.15499,.67,1.71,1.773,1.711,1.648,1.574,1.502,
     + 1.424,1.38,1.378,1.376,1.382,.234,.984,2.589,3.563,3.571,3.427,
     + 3.296,3.156,3.023,2.888,2.796,2.805,2.801,.324,1.383,3.577,
     + 4.947,5.717,5.522,5.297,5.097,4.878,4.672,4.466,4.376,4.367/
  DATA ((SDFIFD(I,J),J=1,6),I=1,4)
     +  /.399,.488,.525,.541,.546,.548,.655,.811,.877,.909,
     + .923,.929,.986,1.232,1.338,1.392,1.42,1.432,1.301,1.636,1.778,
     + 1.853,1.895,1.916/
  DATA ADJ/.75,.8,.85,.9,.95/
  DATA FILE/'RSCUR','MICUR','RSPRO','MIPRO','TXFPB','RSCCH',
     + 'MICCH','RSPCH','MIPCH','TFPCH'/
6 TYPE1
1 FORMAT(' TYPE IN PLAN TO BE TESTED: ',$)
  ACCEPT2,FNAME
2 FORMAT(A5)
  DO 3 IK=1,5
3 IF(FNAME.EQ.FILE(IK)) GO TO (31,32,31,32,33),IK
  TYPE5,FNAME
5 FORMAT(1X,A5,'?, TRY AGAIN'/)
  GO TO 6
31 CALL IFILE(20,'RSPNX')
  GO TO 34
32 CALL IFILE(20,'MIPNX')
  GO TO 34
33 CALL IFILE(20,'TFPNX')
34 CALL IFILE(21,'ONE')
  CALL OFILE(22,FILE(IK+5))
  READ(20,9)(PNIND(J),J=1,60)
  READ(21,9)((POP(I,J,1),J=1,60),I=1,4)
  DO 8 J=1,90
8 READ(21,9) DUMMY
  READ(21,9)((POP(I,J,2),J=1,60),I=1,4)
9 FORMAT(10G)
C
C THIS SECTION DOES A LINEAR INTERPOLATION FOR THE
C INTER YEAR PROBABILITIES OF BEING ORPHANED FOR CHILDREN
C FROM 0 TO 17 YEARS OF AGE.
C
  DO 11 I=1,4
  JN=0
  DO 11 JK=1,12
  N=5
  IF(JK.EQ.1) N=2
  DELTA=PROB(I,JK+1)-PROB(I,JK)
  XINC=DELTA/N
  DO 11 JL=1,N
  JN=JN+1
  IF(JL.GT.1) GO TO 10
  PROB1(I,JN)=PROB(I,JK)
  GO TO 11
10 PROB1(I,JN)=PROB1(I,JN-1)+XINC
  IF(JN.EQ.57) PROB1(I,58)=PROB(I,13)
11 CONTINUE
C
C THE FIRST AGE GROUP IS SCALED BY .6 BECAUSE IT CONTAINS
C PERSONS AGED 15 TO 19 WHILE WE ARE ONLY CONCERNED WITH THOSE
C WHO ARE 15 TO 17.
C
  DO 12 J=1,58
12 PROB1(4,J)=PROB1(4,J)*.6
```

```
C
C THE PROBABILITIES OF BEING ORPHANED AE;NOW MULTIPLIED
C BY THE CORRESPONDING POPULATION.
C
  DO =; K=1,2
  DO 13 I=1,4
  DO 13 J=1,58
13 ORPHBN(I,J,K)=PROB1(I,J)*POP(I,J+2,K)

C
C THE NUMBERS OF ORPHANS ARE TOTALLED FOR EACH YEAR.
C
  DO 14 K=1,2
  DO 14 J=1,58
  DO 14 I=2,4
14 ORPHB(1,JK)=ORPHBN(1,J,K)+ORPHBN(I,JK)
  TYPE15
15 FORMAT(' ENTER ANNUAL VALUE OF ORPHANS BENEFIT ',
     + 'AND YEAR IT BEGINS ',$)
  ACCEPT9,PAYMNT,YR
  IF(PAYMNT.EQ.348.)GO TO 180
  IF(PAYMNT.NE.300.) GO TO 160
  GO TO 222
C
C THE NEXT SECTION MULTIPLIES THE ANNUAL ORPHANS BENEFIT BY
C THE NUMBER OF ORPHANS AND THEN ESCALATES THE RESULTS BY
C THE APPROPRIATE YEAR'S PENSION INDEX.
C
180 DO 181 K=1,2
  DO 182 J=1,6
182 ORPHBN(1,J,K)=ORPHBN(1,J,K)*300.*(PNIND(J+2)/100.)
  DO 181 J=7,58
181 ORPHBN(1,J,K)=ORPHBN(1,J,K)*PAYMNT
  GO TO 170
222 DO 16 K=1,2
  DO 16 J=1,58
  YEAR(J)=1967+J
16 ORPHBN(1,J,K)=ORPHBN(1,J,K)*300.*(PNIND(J+2)/100)
  GO TO 170
160 LOOP=YR-1968
  DO 162 K=1,2
  DO 161 J=1,LOOP
  YEAR(J)=1967+J
161 ORPHBN(1,J,K)=ORPHBN(1,J,K)*300.*(PNIND(J+2)/100)
  DO 162 J=LOOP+1,58
  YEAR(J)=1967+J
162 ORPHBN(1,J,K)=ORPHBN(1,J,K)*PAYMNT*(PNIND(J+2)/PNIND(LOOP+3))
C
C THE BENEFITS ARE THEN TOTALLED BY SEX AND STORED FOR PRINTING.
C
170 DO 17 J=1,58
   ORPHBN(2,J,1)=ORPHBN(1,J,1)+ORPHBN(1,J,2)
  IF(J.GE.3.AND.J.LE.7)ORPHBN(2,J,1)=ORPHBN(2,J,1)*ADJ(J-2)
17 CONTINUE
C
C THE NEXT SECTION DOES A LINEAR INTERPOLATION TO CALCULATE
C THE INTER YEAR PERCENTAGES OF SURVIVING DISABLED FATHERS
C INSURED FOR DISABILITY.THE FIRST DATA YEAR IS 1975.
C
  DO 19 I=1,4
  JN=0
  DO 19 JK=1,5
  DELTA=SDFIFD(I,JK+1)-SDFIFD(I,JK)
  XINC=DELTA/5
  DO 19 JL=1,5
  JN=JN+1
  IF(JL.GT.1) GO TO 18
  PROB2(I,JN)=SDFIFD(I,JK)
  GO TO 19
18 PROB2(I,JN)=PROB2(I,JN-1)+XINC
```

```
19 CONTINUE
C
C FOR THE YEARS BEYOND 2000 WE USE THE VALUES FOR 2000.
C
  DO 20 I=1,4
  PROB2(I,26)=SDFIFD(I,6)
  DO 20 J=27,51
20 PROB2(I,J)=PROB2(I,26)
C
C MULTIPLY THE PERCENTAGES BY THE CORRESPONDING
C POPULATION TO CALCULATE THE NUMBER OF CHILDREN OF
C DISABLED FATHERS.
C
  DO 21 K=1,2
  SCALE=1.
  DO 21 I=1,4
  DO 21 J=8,58
  IF(I.EQ.4) SCALE=.6
21 CHLDBN(I,J,K)=PROB2(I,J-7)*POP(I,J+2,K)*SCALE
  TYPE22
22 FORMAT(' ENTER ANNUAL VALUE OF CHILDRENS BENEFIT ',
     + 'AND YEAR IT BEGINS ',$)
  ACCEPT9,PAYMNT,YR
C
C THE NEXT SECTION FIRST CALCULTES THE 1970 VALUE OF
C ELIGIBLE CHILDREN BY TAKING .75 OF THE 1975 VALUE.
C THE VALUES IN BETWEEN THESE YEARS ARE THEN INTERPOLATED
C USING A TWO POINT LAGRANGEAN PROCEDURE.
C
  DO 23 K=1,2
  DO 23 I=1,4
23 CHLDBN(I,3,K)=CHLDBN(I,8,K)*.75
  DO 24 K=1,2
  DO 24 I=1,4
  DO 24 J=4,7
  JK=J-3
  AJ=((5.-JK)/5.)
  BJ=JK/5.
24 CHLDBN(I,J,K)=AJ*CHLDBN(I,3,K)+BJ*CHLDBN(I,8,K)
C
C THE NEXT SECTION TOTALS THE NUMBER OF CHILDREN ELIGIBLE
C TO RECEIVE BENEFITS AND THEN CALCULATES THE ANNUAL
C COST OF THESE BENEFITS AND ESCALATES THE RESULTS BY THE
C APPROPRIATE YEAR'S PENSION INDEX.
C
  DO 25 K=1,2
  DO 25 J=1,58
  DO 25 I=2,4
25 CHLDBN(1,J,K)=CHLDBN(1,J,K)+CHLDBN(I,J,K)
  IF(PAYMNT.EQ.348.)GO TO 1180
  IF(PAYMNT.NE.300.) GO TO 260
  GO TO 1222
1180 DO 1181 K=1,2
  DO 1182 J=1,6
1182 CHLDBN(1,J,K)=CHLDBN(1,J,K)*300.*(PNIND(J+2)/100.)
  DO 1181 J=7,58
1181 CHLDBN(1,J,K)=CHLDBN(1,J,K)*PAYMNT
  GO TO 1270
1222 DO 26 K=1,2
  DO 26 J=1,58
26 CHLDBN(1,J,K)=CHLDBN(1,J,K)*300.*(PNIND(J+2)/100)
  GO TO 1270
260 LOOP=YR-1968
  DO 262 K=1,2
  DO 261 J=1,LOOP
261 CHLDBN(1,J,K)=CHLDBN(1,J,K)*300.*(PNIND(J+2)/100)
  DO 262 J=LOOP+1,58
262 CHLDBN(1,J,K)=CHLDBN(1,J,K)*PAYMNT*(PNIND(J+2)/PNIND(LOOP+3))
1270 DO 27 J=1,58
```

```
27 CHLDBN(2,J,1)=CHLDBN(1,J,1)+CHLDBN(1,J,2)
   WRITE(22,28)(DKPHRN(2,J,1),J=1,58)
   WRITE(22,28)(CHLDBN(2,J,1),J=1,58)
28 FORMAT(' ',10(1X,1PF10.0))
   TYPE203,FILE(IK+5)
203 FORMAT(' OUTPUT FILE IS ',A5,'.DAT')
   STOP
   END
```

```
C VERSION AS OF AUGUST 28,1972
C PROGRAMME FUND.9
C   CANADA PENSION PLAN -- FUND CALCULATION PROGRAM
C   WRITTEN BY HARRY NEWTON.   MAY 1972.
      REAL MATURE,NETREV,NETRV1,NRGROW
      INTEGER RECALL
      DIMENSION STABLE(2,4),REGION(12,4),CURPRO(2,2)

      DIMENSION TOTAL(56),XINFO(7),INFO(7),ANNINT(60),AIESPY(56)
      DIMENSION FNAME(5),RTNAM(5),DBNAM(5),WDNAM(5),DSNAM(5),WFNAM(5),
     *   CHNAM(5),CNNAM(5),FNOUT(5),TOTINV(60),MATURE(56),CRATE(56)
      DIMENSION RTBEN(56),DHBEN(56),ERWID(50),FRWID(56),ERDSB(56),
     *   FRDSB(56),WFDSB(50),ORPHAN(50),CHILD(56),CPPCN(50),RATE(56)
      DATA CNNAM/'RSCCN','MICCN','RSPCN','MIPCN','TFPCN'/
      DATA FNAME/'RSCUR','MICUR','RSPRO','MIPRO','TXFPB'/
      DATA RTNAM/'RTRSC','RTMIC','RTRSP','RTMIP','RTTFP'/
      DATA DBNAM/'DBRSC','DBMIC','DBRSP','DBMIP','DBTFP'/
      DATA WDNAM/'RSCWD','MICWD','RSPWD','MIPWD','TFPWD'/
      DATA DSNAM/'DSRSC','DSMIC','DSRSP','DSMIP','DSTFP'/
      DATA WFNAM/'RSCWF','MICWF','RSPWF','MIPWF','TFPWF'/
      DATA CHNAM/'RSCCH','MICCH','RSPCH','MIPCH','TFPCH'/
      DATA FNOUT/'RSCFD','MICFD','RSPFD','MIPFD','TFPFD'/
      DATA ITAB,IPAGE,KURPRO/1,0,1/,CNRATE/3.6/,IXAUST/0/
      DATA TOTINV/383.3,764.5,718.7,818.,56*0./
      DATA ANNINT/20.9,63.6,111.,171.3,56*0./
      DATA CNST69/690600000./,RATE69/1.0737/,TOT6/0./,TOT7/2664300000./
      DATA TRGROW,NRGROW,PROV/2*0.,1./
      DATA ((CURPRO(I,J),J=1,2),I=1,2)/' CUR','RENT','PROP','OSED'/
      DATA ((STABLE(I,J),J=1,4),I=1,2)/'REASO','NABLE',' STAB','ILITY',
     1    'MODER','ATE I','NFLAT','ION'/
      DATA ((REGION(I,J),J=1,4),I=1,12)/'NEWFO','UNDLA','ND',' ','PRINC'
     1,'E EDW','ARD I','SLAND','NOVA ','SCOTI','A',' ','NEW B','RUNSW',
     2 'ICK',' ','QUEBE','C',2*' ','ONTAR','IO',2*' ','MANIT','OBA',
     32*' ','SASKA','TCHEW','AN',' ','ALBER','TA',2*' ','BRITI','SH CO',
     4'LUMBI','A','CANAD','A',2*' ','CANAD','A LES','S QUE','BEC'/
      CALL CLOCK1
   12 TYPE 1001
 1001 FORMAT(/,' TYPE IN PLAN TO BE TESTED - ',$)
      ACCEPT 2001,PLAN
 2001 FORMAT(A5)
      DO 10 I=1,5
      IF(PLAN.EQ.FNAME(I)) GO TO 11
   10 CONTINUE
      TYPE 1002,PLAN
 1002 FORMAT(/,' ERROR - NO PLAN CALLED ',A5)
      GO TO 12
   11 NFILE=I
      GO TO (13,14,13,14,15),NFILE
   15 TYPE 1003
 1003 FORMAT(/,' IS TXFPB PLAN MODERATE INFLATION? (Y OR N) ',
     *  '(DEFAULT IS REASONABLE STABILITY) --- ',$)
      ACCEPT 2002,ANSWER
 2002 FORMAT(A1)
      IF(ANSWER.EQ.'Y') GO TO 14
   13 KSTAB=1
      CALL IFILE(29,'RSINT')
      GO TO 16
   14 KSTAB=2
      CALL IFILE(29,'MIINT')
   16 TYPE 1004
 1004 FORMAT(/,' TYPE IN POPULATION SEGMENT USING THESE CODES:',/,1H ,
     16X,'1 - NFLD; 2 - PEI; 3 - NS; 4 - NB; 5 - QUE; 6 - ONT;',/,1H ,
     26X,'7 - MAN; 8 - SASK; 9 - ALTA; 10 - BC; 11 - CANADA;',/,1H ,
     36X,'12 - CANADA LESS QUE (DEFAULT IS 12) --- ',$)
      ACCEPT 2003,IPOP
 2003 FORMAT(10G)
      IF(IPOP.LT.1.OR.IPOP.GT.12) IPOP=12
  IF(IPOP.EQ.6)PROV=.55
  DO 1 I=1,4
  TOTINV(I)=TOTINV(I)*PROV*10**6
```

```
1 ANNINT(I)=ANNINT(I)*PROV*10**6
  CNST69=CNST69*PROV
  TOT7=TOT7*PROV
      TYPE 1017
 1017 FORMAT(/,' IF EXPENSES EXCEED REVENUE, WHICH LOANS WILL BE RECAL',
     1  'LED?',/,' (TYPE -1 FOR MOST RECENT; 0 FOR NONE; 1 FOR ',
     2  'EARLIEST):  ',$)
      ACCEPT 2003,RECALL
      TYPE 1016
 1016 FORMAT(/,' IN THE FOLLOWING QUESTIONS, TYPE IN ALL RATIOS AND',
     * /,' PERCENTAGES AS NUMBERS BETWEEN 0 AND 1.')
      TYPE 1005
 1005 FORMAT(/,' TYPE IN YEAR''S BASIC EXEMPTION - ',$)
      ACCEPT 2003,YBE
      IF(YBE.LT.1.) YBE=YBE*100
      CALL IFILE(29,'OPSHN')
      READ(29,1006) D1,D2,D3,D4,CRATE
 1006 FORMAT(6(/,10G))
      TYPE 1007
 1007 FORMAT(/,' RETIREMENT BENEFITS',/,1H ,19('-'),//,1H , 'TYPE IN RET
     1IREMENT BENEFIT RATIO, AND PERCENTAGE OF',/,1H ,'LOWEST AER''S TO
     2DROP OUT --- ',$)
      ACCEPT 2003,BENRAT,AEROUT
      AEROUT=AEROUT*100
      TYPE 1015
 1015 FORMAT(/,' IS THERE AN EARNINGS TEST? (Y OR N) - ',$)
      ACCEPT 2002,ERTEST
      TYPE 1008
 1008 FORMAT(/,' DISABILITY BENEFITS',/,1H ,19('-'))
      TYPE 1009
 1009 FORMAT(/,' TYPE IN ANNUAL FLAT RATE (IN DOLLARS), AND YEAR IT '
     * 'BEGINS',/,11X,$)
      ACCEPT 2003,XINFO(1),INFO(1)
      TYPE 1010
 1010 FORMAT(/,' TYPE IN PERCENTAGE OF BENEFIT THAT IS EARNINGS RELATED,
     *'/,1H ,'AND YEAR IT BEGINS --- ',$)
      ACCEPT 2003,XINFO(2),INFO(2)
      XINFO(2)=XINFO(2)*100
      TYPE 1011
 1011 FORMAT(/,' CHILDREN''S BENEFITS',/,1H ,19('-'))
      TYPE 1009
      ACCEPT 2003,XINFO(3),INFO(3)
      TYPE 1012
 1012 FORMAT(/,' WIVES'' BENEFITS',/,1H ,15('-'))
      TYPE 1009
      ACCEPT 2003,XINFO(4),INFO(4)
      TYPE 1013
 1013 FORMAT(/,' WIDOWS'' BENEFITS',/,1H ,16('-'))
      TYPE 1009
      ACCEPT 2003,XINFO(5),INFO(5)
      TYPE 1010
      ACCEPT 2003,XINFO(6),INFO(6)
      XINFO(6)=XINFO(6)*100
      TYPE 1014
 1014 FORMAT(/,' ORPHANS'' BENEFITS',/,1H ,17('-'))
      TYPE 1009
      ACCEPT 2003,XINFO(7),INFO(7)
C
C
C   READ-IN SECTION.
C
C       D1,D2,D3,D4 ARE DUMMY VARIABLES USED TO STORE DATA FOR YEARS
C       PRIOR TO 1970.
C
C   READ IN EFFECTIVE ANNUAL RATE OF INTEREST ON NEW INVESTMENTS.
      READ(29,2003) RATE
C   READ IN TOTAL CONTRIBUTIONS.
      CALL IFILE(29,CNNAM(NFILE))
      READ(29,2004) D1,D2,D3,D4,CPPCN
 2004 FORMAT(5G)
```

```
C     READ IN RETIREMENT BENEFITS.
      CALL IFILE(29,RTNAM(NFILE))
      READ(29,2004) RTBEN
C     READ IN DEATH BENEFITS.
      CALL IFILE(29,DBNAM(NFILE))
      READ(29,2004) DHBEN
C     READ IN WIDOWS' BENEFITS  --  EARNINGS RELATED AND FLAT RATE.
      CALL IFILE(29,WDNAM(NFILE))
      READ(29,2005) D1,D2,ERWID,D3,D4,FRWID
 2005 FORMAT(8G)
C     READ IN DISABILITY BENEFITS  --  EARNINGS RELATED AND FLAT RATE.
      CALL IFILE(29,DSNAM(NFILE))
      READ(29,2003) ERDSB
      READ(29,2003) FRDSB
C     READ IN WIVES' BENEFITS.
      CALL IFILE(29,WFNAM(NFILE))
      READ(29,2003) WFDSB
C     READ IN CHILDREN'S AND ORPHANS' BENEFITS.
      CALL IFILE(29,CHNAM(NFILE))
      READ(29,2003) D1,D2,ORPHAN
      READ(29,2003) D1,D2,CHILD
C
C     OUTPUT SECTION.
C
  300 CALL OFILE(28,FNOUT(NFILE))
      CALL TIME(TCLOCK)
      CALL TDATE(LDAY,LMONTH,LYEAR)
      IF(NFILE.GT.2) KURPRO=2
      WRITE(28,4016) LDAY,LMONTH,LYEAR,TCLOCK
      WRITE(28,4009) (STABLE(KSTAB,J),J=1,4),(CURPRO(KURPRO,J),J=1,2),
     *     (REGION(IPOP,J),J=1,4)
      IF(NFILE.EQ.5) WRITE(28,4020)
      IF(YBE.LT.100.) GO TO 301
      WRITE(28,4010) YBE
      GO TO 302
  301 WRITE(28,4011) YBE
  302 WRITE(28,4012) CNRATE,ISTCNR
      WRITE(28,4023)
      WRITE(28,4013) BENRAT,AEROUT
      ERTST='YES'
      IF(ERTEST.EQ.'N') ERTST='NO'
      WRITE(28,4018) ERTST
      WRITE(28,1008)
      WRITE(28,4014) XINFO(1),INFO(1)
      WRITE(28,4015) XINFO(2),INFO(2)
      WRITE(28,1011)
      WRITE(28,4014) XINFO(3),INFO(3)
      WRITE(28,1012)
      WRITE(28,4014) XINFO(4),INFO(4)
      WRITE(28,1013)
      WRITE(28,4014) XINFO(5),INFO(5)
      WRITE(28,4015) XINFO(6),INFO(6)
      WRITE(28,1014)
      WRITE(28,4014) XINFO(7),INFO(7)
      WRITE(28,4019)
      DO 400 I=1,56
      IYEAR=I+1969
      IF(I.EQ.1.OR.I.EQ.29) GO TO 401
      GO TO 402
  401 IPAGE=IPAGE+1
      WRITE(28,4017)
      WRITE(28,4005) ITAB,LDAY,LMONTH,LYEAR,TCLOCK,IPAGE
      WRITE(28,4004)
      WRITE(28,4003) (STABLE(KSTAB,J),J=1,4),(CURPRO(KURPRO,J),J=1,2),
     *     (REGION(IPOP,J),J=1,4)
      IF(NFILE.EQ.5) WRITE(28,4020)
      WRITE(28,4000)
  402 EXPENS=.001*CPPCN(I)/CRATE(I)
      TOTAL(I)=RTBEN(I)+FRDSB(I)+ERDSB(I)+CHILD(I)+WFDSB(I)+FRWID(I)+
     *     ERWID(I)+ORPHAN(I)+DHBEN(I)+EXPENS
      IF(MOD(I,4).EQ.1) WRITE(28,4002)
```

```
400 WRITE(28,4001) IYEAR,RTBEN(I),FRDSB(I),ERDSB(I),CHILD(I),WFDSF(I),
   *       FRWID(I),ERWID(I),ORPHAN(I),DHBEN(I),EXPENS,TOTAL(I)
    ITAB=2
    IPAGE=0
    DO 500 I=1,56
    IYEAR=I+1969
    IF(I.EQ.1.OR.I.EQ.29) GO TO 501
    GO TO 502
501 IPAGE=IPAGE+1
    WRITE(28,4017)
    WRITE(28,4005) ITAB,LDAY,LMONTH,LYEAR,TCLOCK,IPAGE
    WRITE(28,4008)
    WRITE(28,4003) (STABLE(KSTAB,J),J=1,4),(CURPRO(KURPRO,J),J=1,2),
   *       (REGION(IPOP,J),J=1,4)
    IF(NFILE.EQ.5) WRITE(28,4020)
    WRITE(28,4006)
502 IRECAL=I+4
    IF(RECALL.EQ.1) IRECAL=1
    AIESPY(I)=ANNINT(I+3)
    IF(I.GT.17) AIESPY(I)=AIESPY(I)-ANNINT(I-17)
    MATURE(I)=0.
    IF(I.GT.16) MATURE(I)=TOTINV(I-16)
504 TOTINV(I+4)=CPPCN(I)+AIESPY(I)+MATURE(I)-TOTAL(I)
    IF(TOTINV(I+4).GT.0..OR.RECALL.EQ.0) GO TO 503
    IRECAL=IRECAL+RECALL
    IF(IRECAL.GT.(I+3).OR.IRECAL.LT.1) GO TO 503
    MATURE(I)=MATURE(I)+TOTINV(IRECAL)
    TOTINV(IRECAL)=0.
    GO TO 504
503 TOT6=TOT6+MATURE(I)
    TOT7=TOT7+TOTINV(I+4)
    XINT=TOTINV(I+4)*RATE(I)/100.
    ANNINT(I+4)=ANNINT(I+3)+XINT
    COL12=TOT7-TOT6
    ADJ13=ANNINT(I+4)
    IF(I.GT.16) ADJ13=ADJ13-ANNINT(I-16)
    COL13=COL12+.25*ADJ13
    COL14=CNST69*RATE69**I
    COL15=.125*(COL14+TOTAL(I)-CPPCN(I))
    FUND=COL13+COL15
    IF(FUND.LT.0..AND.IXAUST.EQ.0) WRITE(28,4022) IYEAR
    IF(FUND.LT.0.) IXAUST=1
    IF(FUND.LT.0.) FUND=0.
    IF(I.GT.16) TOTINV(I-16)=0.
    IF(MOD(I,4).EQ.1) WRITE(28,4002)
500 WRITE(28,4007) IYEAR,CPPCN(I),TOTAL(I),FUND
    ITAB=3
    IPAGE=0
    DO 600 I=1,56
    IYEAR=I+1969
    IF(I.EQ.1.OR.I.EQ.29) GO TO 601
    GO TO 602
601 IPAGE=IPAGE+1
    WRITE(28,4017)
    WRITE(28,4005) ITAB,LDAY,LMONTH,LYEAR,TCLOCK,IPAGE
    WRITE(28,4024)
    WRITE(28,4003) (STABLE(KSTAB,J),J=1,4),(CURPRO(KURPRO,J),J=1,2),
   *       (REGION(IPOP,J),J=1,4)
    IF(NFILE.EQ.5) WRITE(28,4020)
    WRITE(28,4025)
602 TOTREV=CPPCN(I)+AIESPY(I)+MATURE(I)
    NETREV=TOTREV-TOTAL(I)
    IF(I.EQ.1) GO TO 603
    TRGROW=(TOTREV-TOTRV1)*100./ABS(TOTRV1)
    NRGROW=(NETREV-NETRV1)*100./ABS(NETRV1)
603 TOTRV1=TOTREV
    NETRV1=NETREV
    IF(MOD(I,4).EQ.1) WRITE(28,4002)
600 WRITE(28,4026) IYEAR,CPPCN(I),AIESPY(I),MATURE(I),TOTREV,TRGROW,
   *       TOTAL(I),NETREV,NRGROW
```

```
      WRITE(28,4017)
      T=CLOCK(0,0)*60.
      TYPE 4021,FNOUT(NFILE),T
4000 FORMAT(  /,25X,'-------DISABILITY PENSIONS----------   WIDOWS'' PE
    1NSIONS',25X,'EXPENSES',/,' CALENDAR   RETIREMENT',61X,'ORPHANS''
    2  DEATH',8X,'OF',/,1H ,2X,'YEAR',6X,'PENSIONS    FLAT  EARNINGS ',
    3' CHILDREN''S   WIVES''     FLAT  EARNINGS   BENEFITS   BENEFITS'
    4,3X,'ADMINIS-',5X,'TOTAL',/,1H ,24X,'RATE   RELATED   BENEFITS'
    5,3X,'PENSIONS     RATE   RELATED',26X,'TRATION')
4001 FORMAT(1H ,2X,I4,6X,-6PF7.1,2(3X,-6PF6.1),2(5X,-6PF6.1),3X,-6PF6.1
    *  ,2X,-6PF8.1,5X,3(-6PF7.1,4X),-6PF8.1)
4002 FORMAT(2X)
4003 FORMAT(/,1X,4A5,1X,2A4,' PLAN',T85,'REGION: ',4A5)
4004 FORMAT(  /,41X,'CANADA PENSION PLAN',/,1H ,30X,'BENEFITS AND EXPEN
    1SES OF ADMINISTRATION',/,1H ,32X,'(ALL FIGURES IN MILLIONS OF DOLL
    2ARS)')
4005 FORMAT(1H1,'TABLE NO.',I2,20X,'RUN DATED',I3,'/',I2,'/',I2,3X,
    * 'TIME: ',A5,20X,'PAGE',I2,' OF 2')
4006 FORMAT(/,' CALENDAR',7X,'CONTRIBUTIONS',8X,'BENEFITS &',9X,
    *  'FUND AT',/,'   YEAR',31X,'EXPENSES',9X,'YEAR END')
4007 FORMAT(1H ,2X,I4,9X,-6PF11.1,8X,-6PF11.1,6X,-6PF11.1)
4008 FORMAT(/,41X,'CANADA PENSION PLAN',/,1H ,41X,'FUND PROJECTIONS',
    * /,1H ,32X,'(ALL FIGURES IN MILLIONS OF DOLLARS)')
4009 FORMAT(/,    ' CANADA PENSION PLAN',/,1H ,    'SCHEME:  ',4A5,1X,
    12A4 ,' PLAN',/,1H ,    'REGION:  ',4A5,//,1H ,    'ASSUMPTIONS FOR
    2 THIS SCHEME')
4010 FORMAT(/,' YEAR''S BASIC EXEMPTION IS ',F6.0,' DOLLARS')
4011 FORMAT(/,' YEAR''S BASIC EXEMPTION IS',F6.1,' PER CENT')
4012 FORMAT(1H ,'TOTAL CONTRIBUTION RATE IS ',F6.2,' PER CENT, BEGINNIN
    *G IN',I5)
4013 FORMAT( /,' RETIREMENT BENEFIT RATIO IS ',F6.3,/,1H ,'PERCENTAGE O
    *F LOWEST AER''S TO DROP OUT IS ',F5.1,' PER CENT')
4014 FORMAT(/,' ANNUAL FLAT RATE IS ',F6.0,' DOLLARS, BEGINNING IN',
    * I5)
4015 FORMAT(1H ,'PERCENTAGE OF BENEFIT THAT IS EARNINGS RELATED IS ',
    *  F5.1,' PER CENT, BEGINNING IN',I5)
4016 FORMAT(1H1,'RUN DATED',I3,'/',I2,'/',I2,3X,'TIME: ',A5,30X,'PAGE 1
    * OF 1')
4017 FORMAT( /,' TABLES PREPARED BY TAXATION AND FISCAL POLICY BRANCH,
    1MINISTRY OF TREASURY, ECONOMICS',/,1H ,19X,'AND INTERGOVERNMENTAL
    2AFFAIRS, GOVERNMENT OF ONTARIO')
4018 FORMAT(1H ,'EARNINGS TEST? - ',A3)
4019 FORMAT(//,2X)
4020 FORMAT(1H+,35X,'- TXFPB PROPOSALS')
4021 FORMAT(//,' END OF RUN',//,' OUTPUT FILE IS ',A5,'.DAT',//,
    *  ' EXECUTION TIME = ',F8.3,' SECONDS',///)

4022 FORMAT(/,1X,I6,15X,'**** CPP FUND IS EXHAUSTED ****')
4023 FORMAT(/,' RETIREMENT BENEFITS',/,1H ,19('-'))
4024 FORMAT(/,41X,'CANADA PENSION PLAN',/,1H ,40X,'REVENUE PROJECTIONS'
    *  ,/,1H ,32X,'(ALL FIGURES IN MILLIONS OF DOLLARS)')
4025 FORMAT(/,' CALENDAR   CONTRIBUTIONS   INTEREST      LOAN',6X,
    1 'TOTAL REVENUE   GROWTH IN     BENEFITS &   NET REVENUE',4X,
    2  'GROWTH IN',/,3X,'YEAR',32X,'REPAYMENTS',18X,'TOTAL REVENUE',
    3  4X,'EXPENSES',18X,'NET REVENUE',/,72X,'(%)',39X,'(%)')
4026 FORMAT(1H ,I6,5X,-6PF11.1,2(3X,-6PF9.1),5X,-6PF11.1,6X,0PF7.1,
    *  2X,2(3X,-6PF11.1),6X,0PF7.1)
      STOP
      END
```

```
C VERSION AS OF AUGUST 17,1972
C PROGRAMME CPPBN.10
       REAL YMPE(60),RETBN(60),WIDOW(60),WIDFLT(60),WIDERN(60)
       REAL LMPSM(60),DISABL(60),DISWIF(60),MATUR(60),DISFLT(60)
       REAL DISERN(60),CHLDBN(60),YR(60),CPI(120),OAS(60),GIS(60)
       DATA MATUR/0.0,.1,.2,.3,.4,.5,.6,.7,.8,.9,50*1./
 DATA CPI/6*1.0,1.036,1.034,1.032,51*1.03,6*1.,1.028,1.022,1.016
    &,51*1.01/
       CALL OFILE(29,'BENFT')
       TYPE 100
100    FORMAT(' SPECIFY PLAN TO BE TESTED: ',$)
       ACCEPT  150,FNAME
150    FORMAT(A5)
       TYPE 101
101    FORMAT(' SPECIFY PENSIONER''S LIFETIME AVERAGE EARNINGS RATIO: '
    &,$)
       ACCEPT 151,AER
151    FORMAT(G)
       TYPE 102
102    FORMAT(' SPECIFY CEILING ON PENSION INDEX IN 1973 ET SEQ: ',$)
       ACCEPT 151,CEILNG
       TYPE 103
103    FORMAT(' SPECIFY RETIREMENT RATE: ',$)
       ACCEPT 151,RETRT
       TYPE 104
104    FORMAT(' SPECIFY WIDOW''S MONTHLY FLAT RATE IN 1973: ',$)
       ACCEPT 151,WIDFLT(8)
       TYPE 105
105    FORMAT(' SPECIFY WIDOW''S EARNINGS RELATED RATIO: ',$)
       ACCEPT 151,WIDRT
       TYPE 106
106    FORMAT(' SPECIFY ORPHAN''S MONTHLY FLAT RATE IN 1973: ',$)
       ACCEPT 151,CHLDBN(8)
       TYPE 107
107    FORMAT(' SPECIFY DISABILITY MONTHLY FLAT RATE IN 1973: ',
    &$)
       ACCEPT 151,DISFLT(8)
       TYPE 108
108    FORMAT(' SPECIFY DISABILITY EARNINGS RELATED RATIO IN 1973 ET ',
    &'SEQ: ',$)
       ACCEPT 151,DISRT
       TYPE 109
109    FORMAT(' SPECIFY MONTHLY BENEFIT FOR WIFE OF DISABLED IN 1973: '
    &,$)
       ACCEPT 151,DISWIF(8)
       CALL IFILE(20,FNAME)
       READ(20,110) (YMPE(J),J=1,60)
110    FORMAT(10G)
       DO 200  J=8,60
       RETBN(J)=RETRT*AER*MATUR(J)*((YMPE(J)+YMPE(J-1)+YMPE(J-2))/3.)/1
    &2.
       WIDERN(J)=WIDRT*(RETBN(J)*(1./MATUR(J)))
       DISERN(J)=DISRT*(RETBN(J)*(1./MATUR(J)))
200    LMPSM(J)=.1*YMPE(J)
       DO 210 J=9,60
       WIDFLT(J)=WIDFLT(J-1)*CEILNG
       DISFLT(J)=DISFLT(J-1)*CEILNG
       CHLDBN(J)=CHLDBN(J-1)*CEILNG
210    DISWIF(J)=DISWIF(J-1)*CEILNG
C DO 215 J=9,60
C215 CHLDBN(J)=29.
       DO 220 J=8,60
       WIDOW(J)=WIDERN(J)+WIDFLT(J)
220    DISABL(J)=DISERN(J)+DISFLT(J)
       DO 230 J=1,60
230    YR(J)=1965+J
  JJ=0
  IF(FNAME.EQ.'RSCUR'.OR.FNAME.EQ.'RSPRO')JJ=60
  OAS(7)=82.88
  GIS(7)=67.12
  DO 240 J=8,60
```

```
  OAS(J)=OAS(J-1)*CPI(J-1+JJ)
240 GIS(J)=GIS(J-1)*CPI(J-1+JJ)
  WRITE(29,298) FNAME,AER,CEILNG,RETRT
298 FORMAT(' PLAN: ',A5,5X,' AER: ',F4.2,5X,' PENSION INDEX',
    &' CEILING: ',F4.2,5X,' RETIREMENT RATE: ',F4.2,/)
  WRITE(29,299) WIDRT,DISRT
299 FORMAT(' WIDOW''S EARNINGS RELATED RATIO: ',F5.3,5X,' DIS',
    &'ABILITY EARNINGS RELATED RATIO: ',F4.2,//)
       WRITE(29,300)
300    FORMAT('                                      MAXIMUM     MAXIMUM   MAXIMU',
    &'M                  MAXIMUM     MAXIMUM MONTHLY   MAXIMUM MONTHLY')
       WRITE(29,301)
301    FORMAT('             YEAR''S MAXIMUM  MONTHLY     MONTHLY   MONTHL',
    &'Y     MAXIMUM    MONTHLY       PENSION TO        PENSION TO')
       WRITE(29,302)
302    FORMAT(' YEAR OF  PENSIONABLE    RETIREMENT   WIDOW''S  ORPHAN',
    &'''S   LUMP SUM   DISABILITY     WIFE OF              CHILD OF',
    &'           MONTHLY')
       WRITE(29,303)
303    FORMAT(' PENSION    EARNINGS      PENSION      PENSION   PENSIO',
    &'N     PAYMENT    PENSION        DISABLED             DISABLED',
    &'    O.A.S. G.I.S.')
       WRITE(29,304)
304    FORMAT(' ------- -------------  ----------   -------   ------',
    &'--    --------   ----------  ---------------   ---------------',
    &' ------ ------')
       DO 350 J=8,60
       WRITE(29,310) YR(J),YMPE(J),RETBN(J),WIDOW(J),CHLDBN(J),LMPSM(J)
    &,DISABL(J),DISWIF(J),CHLDBN(J),OAS(J),GIS(J)
310    FORMAT(2X,F5.0,5X,F7.0,7X,F7.2,5X,F7.2,4X,F6.2,5X,F6.0,5X,F7.2,
    &8X,F6.2,12X,F6.2,7X,F6.2,2X,F6.2)
350    CONTINUE
       STOP
       END
```